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Multidrug-resistant *Candida auris*: Update on Current U.S. Epidemiology, Clinical Profile, Management, and Control Strategies

Clinician Outreach and Communication Activity (COCA)

June 20, 2019

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  - **404-639-3286** or send an email to **media@cdc.gov**.
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At the conclusion of the session, participants will be able to accomplish the following:

- Describe risk factors for *C. auris* infection and colonization.
- Discuss resistance patterns in *C. auris*.
- Describe evolving treatment options for *C. auris*.
- Define steps to take when a case of *C. auris* is suspected or identified.

Today's First Presenter

Tom Chiller, MD, MPH
Branch Chief, Mycotic Diseases Branch
Division of Foodborne, Waterborne, and Environmental Diseases
National Center for Emerging and Zoonotic Infectious Diseases
Centers for Disease Control and Prevention

Today's Second Presenter

Snigdha Vallabhaneni, MD, MPH

Medical Epidemiologist, Prevention and Response Branch
Division of Healthcare Quality Promotion
National Center for Emerging and Zoonotic Infectious Diseases
Centers for Disease Control and Prevention

Multidrug-resistant *Candida auris*: Update on Current U.S. Epidemiology, Clinical Profile, Management, and Control Strategies

Tom Chiller, MD, MPH

Snigdha Vallabhaneni, MD, MPH

June 20, 2019

Today's Outline

- Current epidemiology
- Identification methods
- Management strategies
- Infection prevention strategies

Candida auris epidemiology

Global and U.S. emergence

"All the News That's Fit to Print"

The New York Times

Late Edition

Today, sunshine mixing with some clouds, mild, high 64. **Tonight**, cloudy, periodic rain, low 53. **Tomorrow**, a brief shower or two, high 72. Details in SportsSunday, Page 10.

VOL. CLXVIII . . No. 58,290 NEW YORK, SUNDAY, APRIL 7, 2019 $6.00

DADO GALDIERI FOR THE NEW YORK TIMES

A scout discovered Maradoninha, 11, two years ago. His family moved 1,200 miles to enable him to get first-class training.

Fungus Immune to Drugs Quietly Sweeps the Globe

Lethal Infection Adds Alarming Dimension to Dangers of Overusing Medicines

By MATT RICHTEL and ANDREW JACOBS

Last May, an elderly [illegible] admitted to the Brooklyn branch of Mount Sinai Hospital for abdominal surgery. A blood test revealed that he was infected with a newly discovered germ as deadly as it was mysterious. Doctors swiftly isolated him in the intensive care unit.

DEADLY GERMS, LOST CURES
A New Public Health Threat

The germ, a fungus called Candida auris, preys on people with weakened immune systems, and it is quietly spreading across the globe. Over the last five years, it has hit a neonatal unit in Venezuela, swept through a hospital in Spain, forced a prestigious British medical center to shut down its intensive care unit, and taken root in [illegible] example of one of the world's most intractable health threats: the rise of drug-resistant infections.

For decades, public health experts have warned that the overuse of antibiotics was reducing the effectiveness of drugs that have lengthened life spans by curing bacterial infections once commonly fatal. But lately, there has been an explosion of resistant fungi as well, adding a new and frightening dimension to a phenomenon that is undermining a pillar of modern medicine.

"It's an enormous problem," said Matthew Fisher, a professor of fungal epidemiology at Imperial College London, who was a coauthor of a recent scientific review on the rise of resistant fungi.

First reported in Japan and now, worldwide

Japan

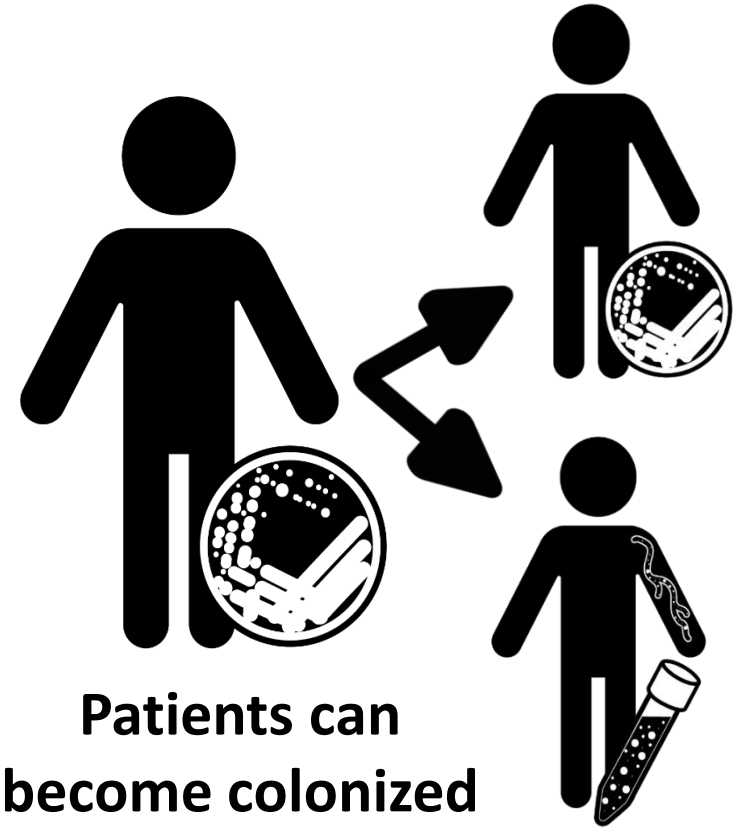
2009

United States

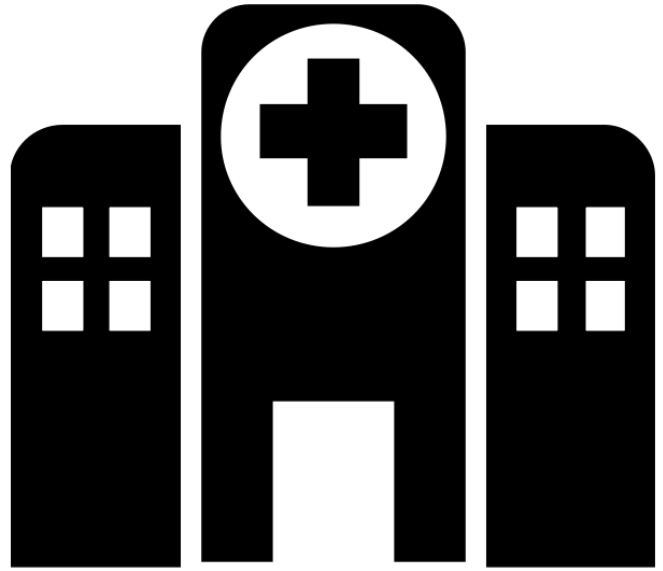
2016

Why are we concerned about *Candida auris?*

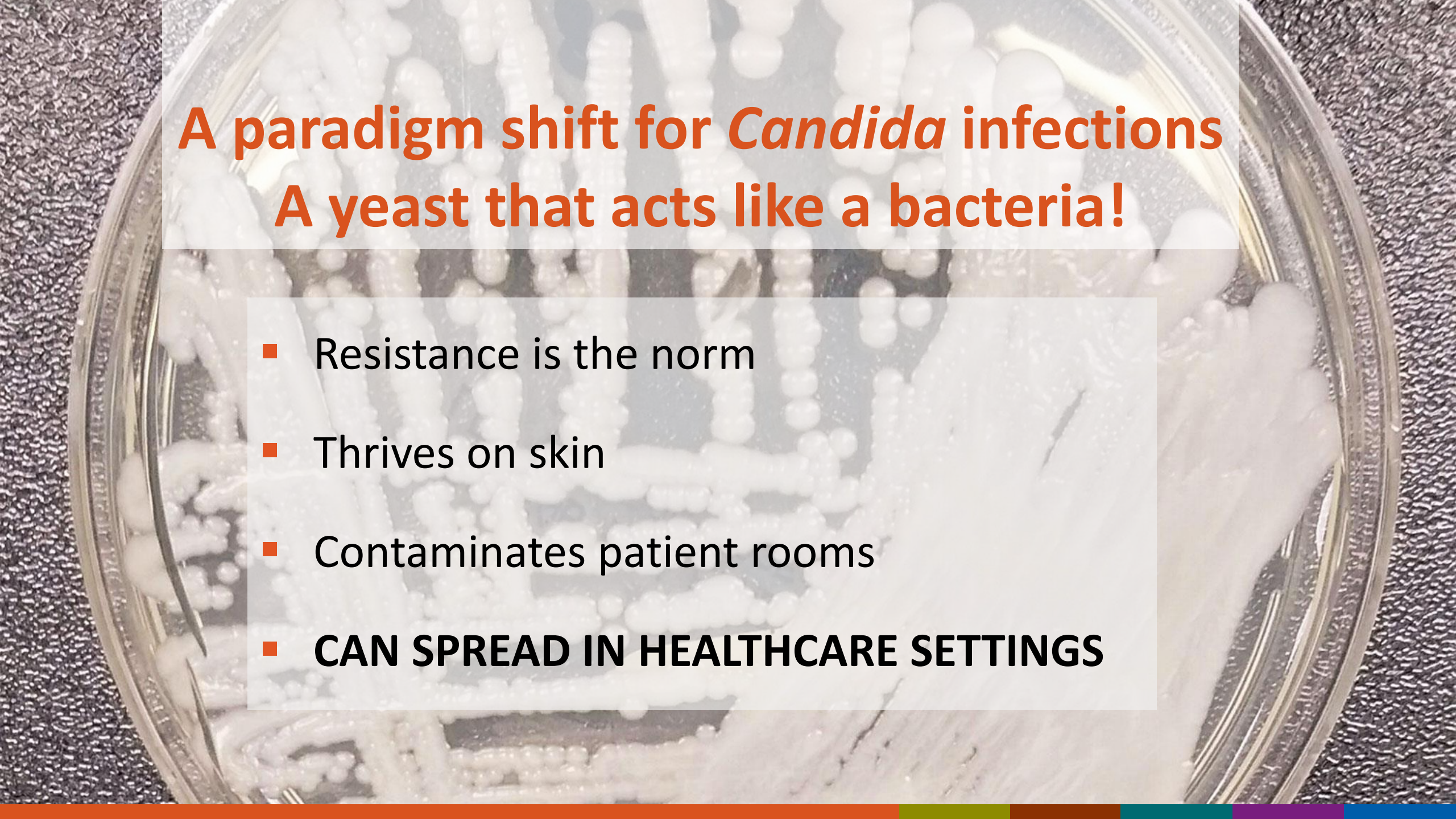
Highly drug-resistant



Patients can become colonized and develop invasive infections



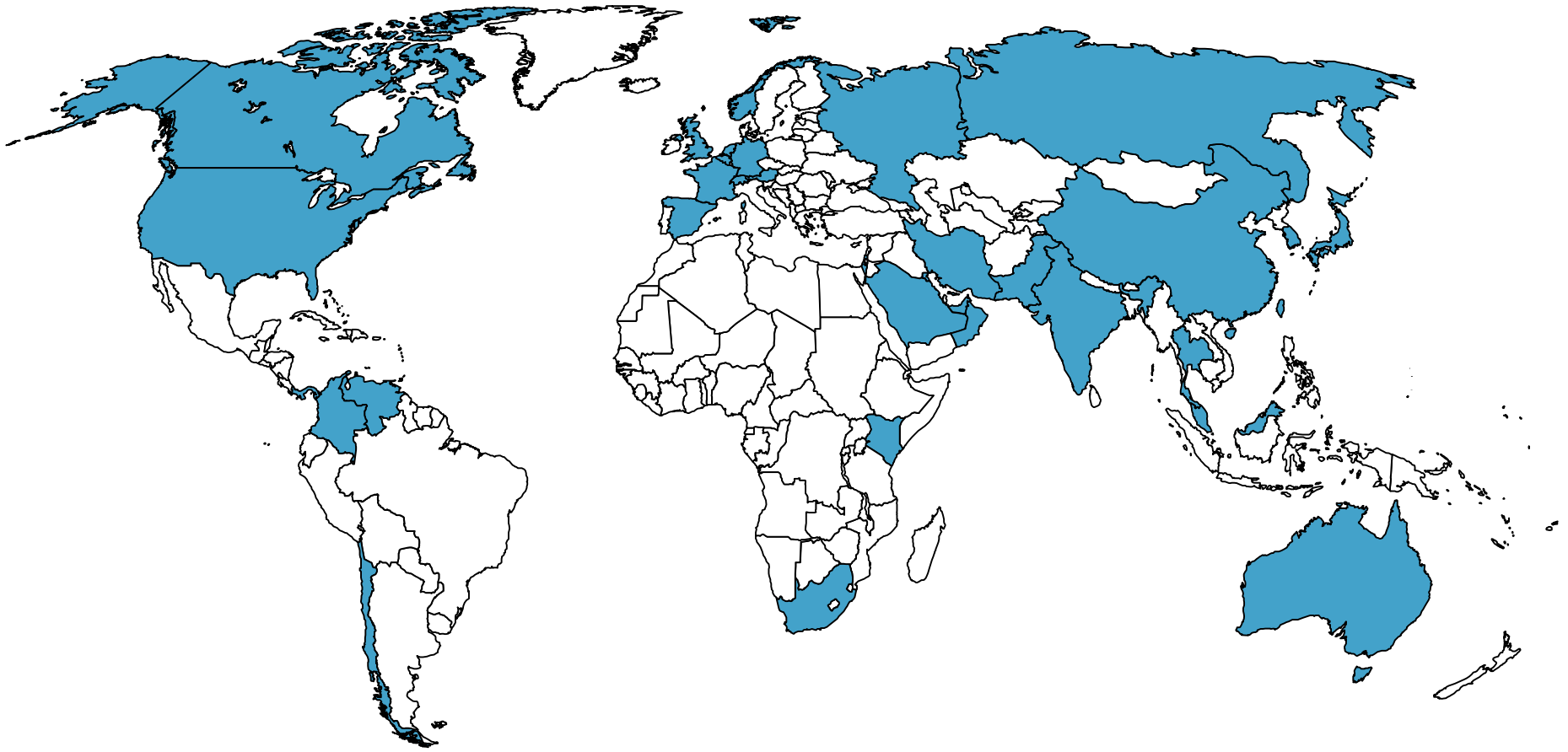
Spreads in healthcare settings



A paradigm shift for *Candida* infections
A yeast that acts like a bacteria!

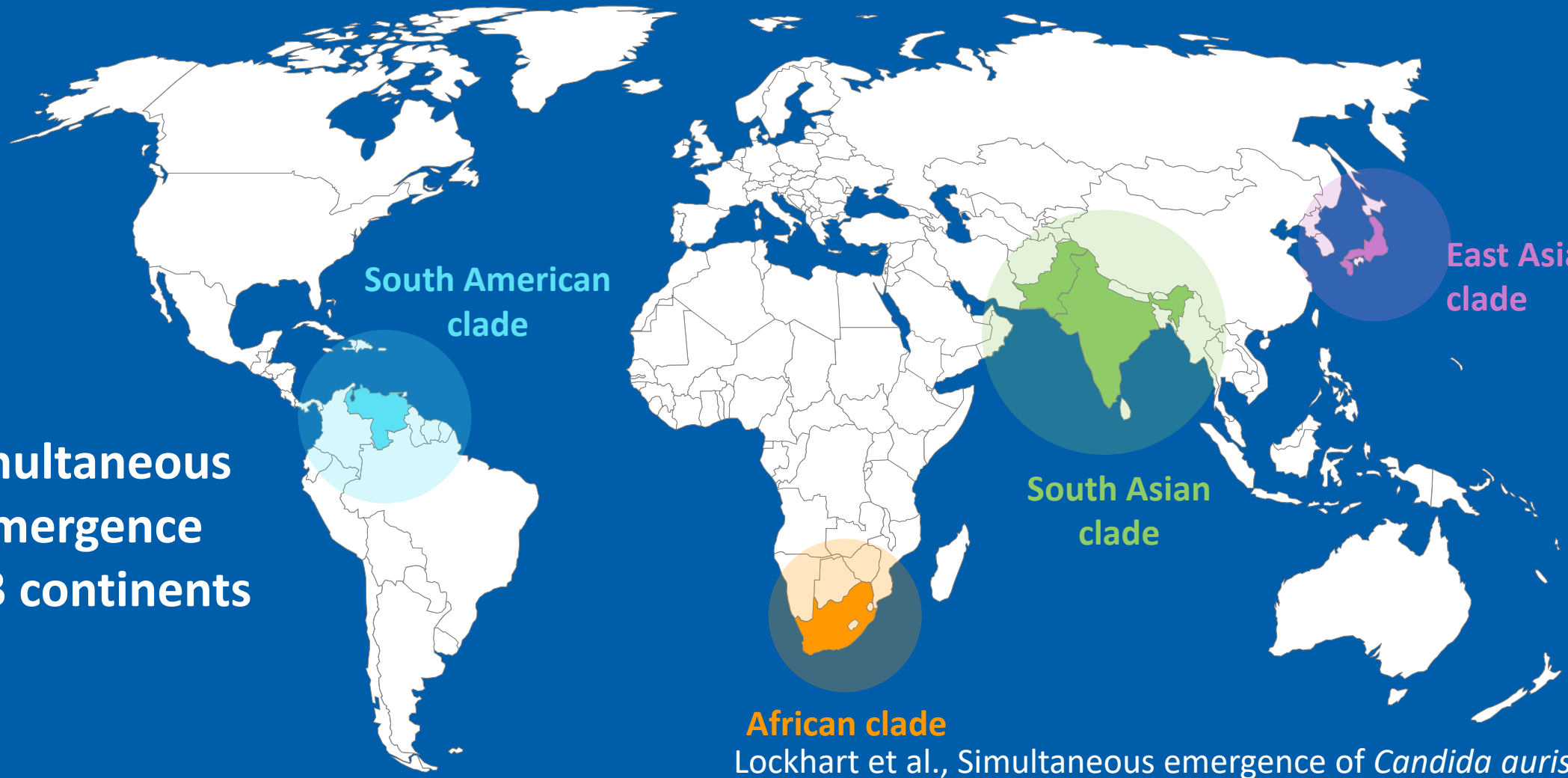
- Resistance is the norm
- Thrives on skin
- Contaminates patient rooms
- **CAN SPREAD IN HEALTHCARE SETTINGS**

C. auris cases have been reported in >30 countries



https://www.cdc.gov/fungal/candida-auris/tracking-c-auris.html

Strong phylogeographic structure – 4 clades



Simultaneous emergence on 3 continents

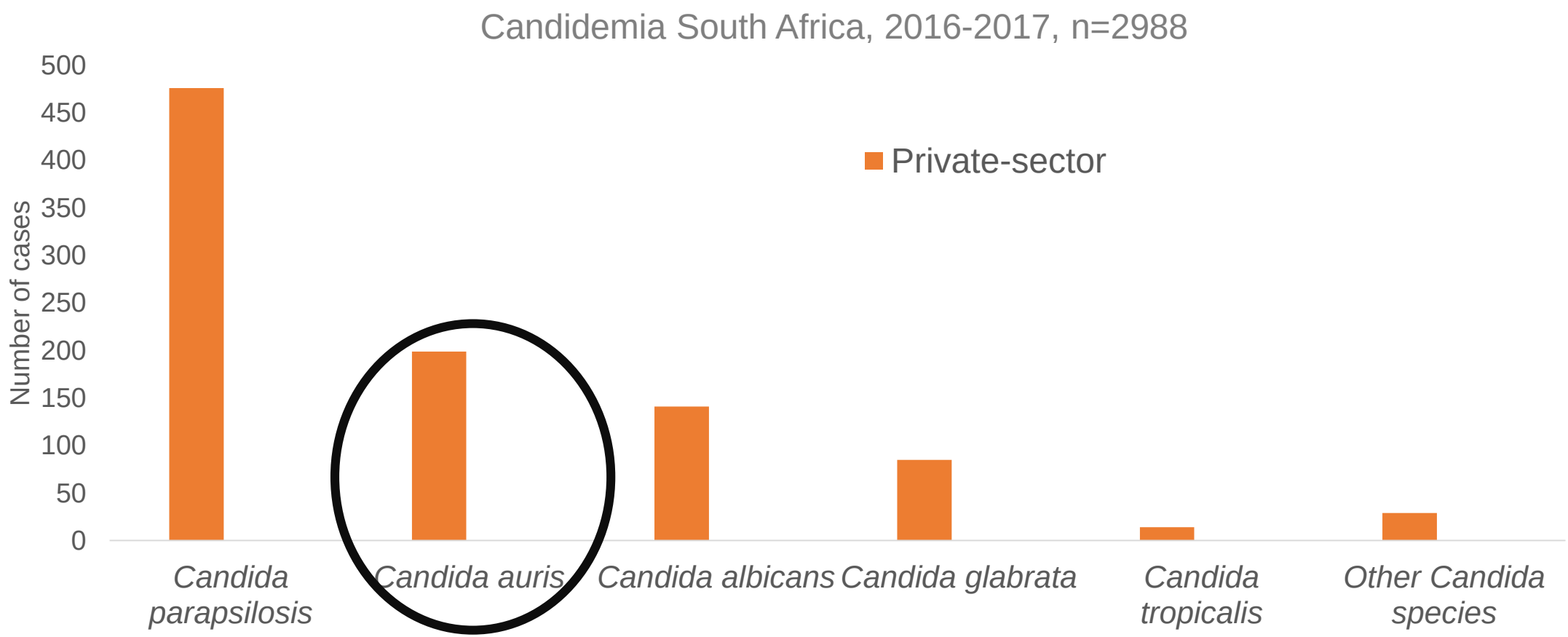
Lockhart et al., Simultaneous emergence of *Candida auris CID* 2017

India – high prevalence of *C. auris* in some hospitals

- Study of 27 ICUs in India (2011-12)
  - 19 already had *C. auris*
  - 5% of candidemia in ICUs
  - As high as 50% of candidemia in some hospitals

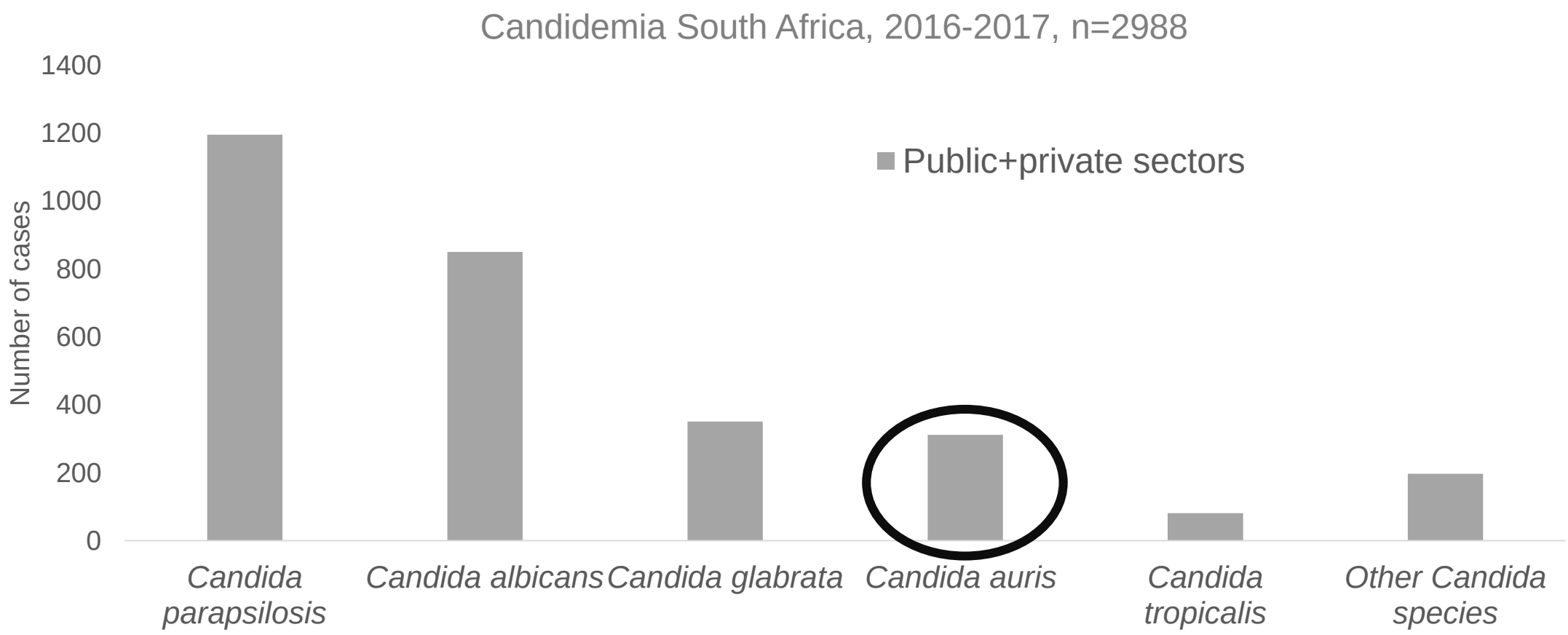
Rudramurthy et al, *Candida auris* candidaemia in Indian ICUs: analysis of risk factors, JAC 2017

South Africa – *C. auris* is now a major cause of candidemia



NICD GERMS Annual Report 2017 www.nicd.ac.za

South Africa – *C. auris* is now a major cause of candidemia

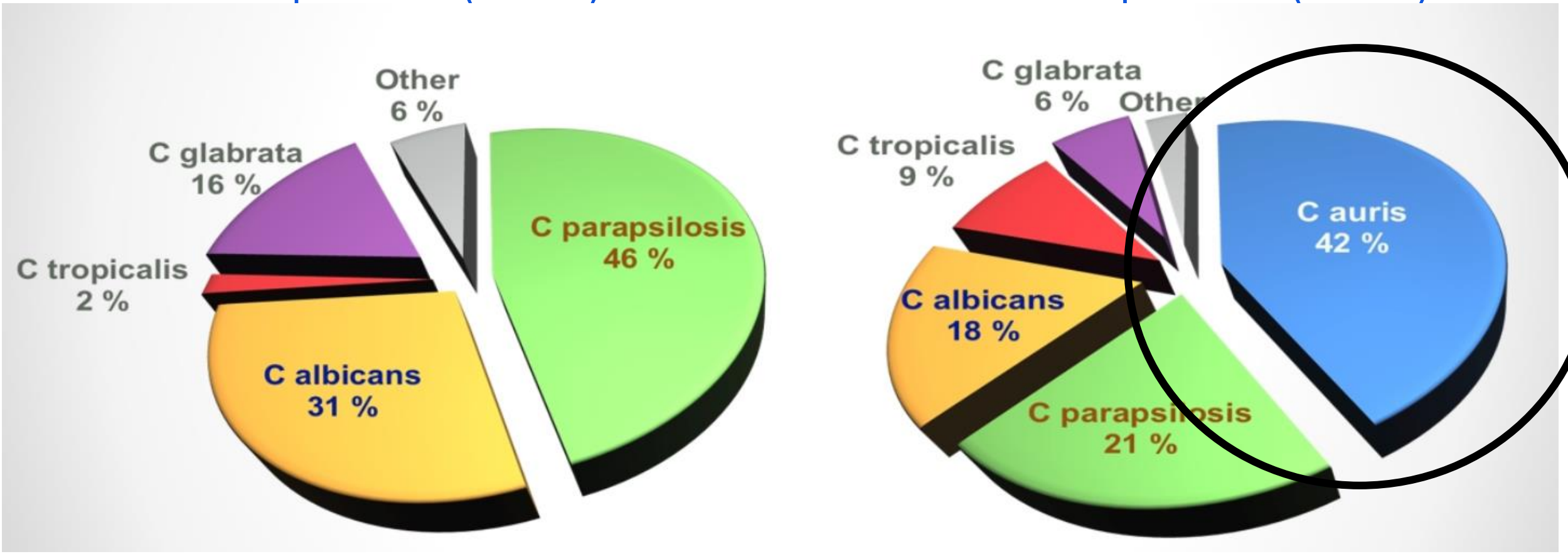


NICD GERMS Annual Report 2017 www.nicd.ac.za

Spain Outbreak (2016-2017)

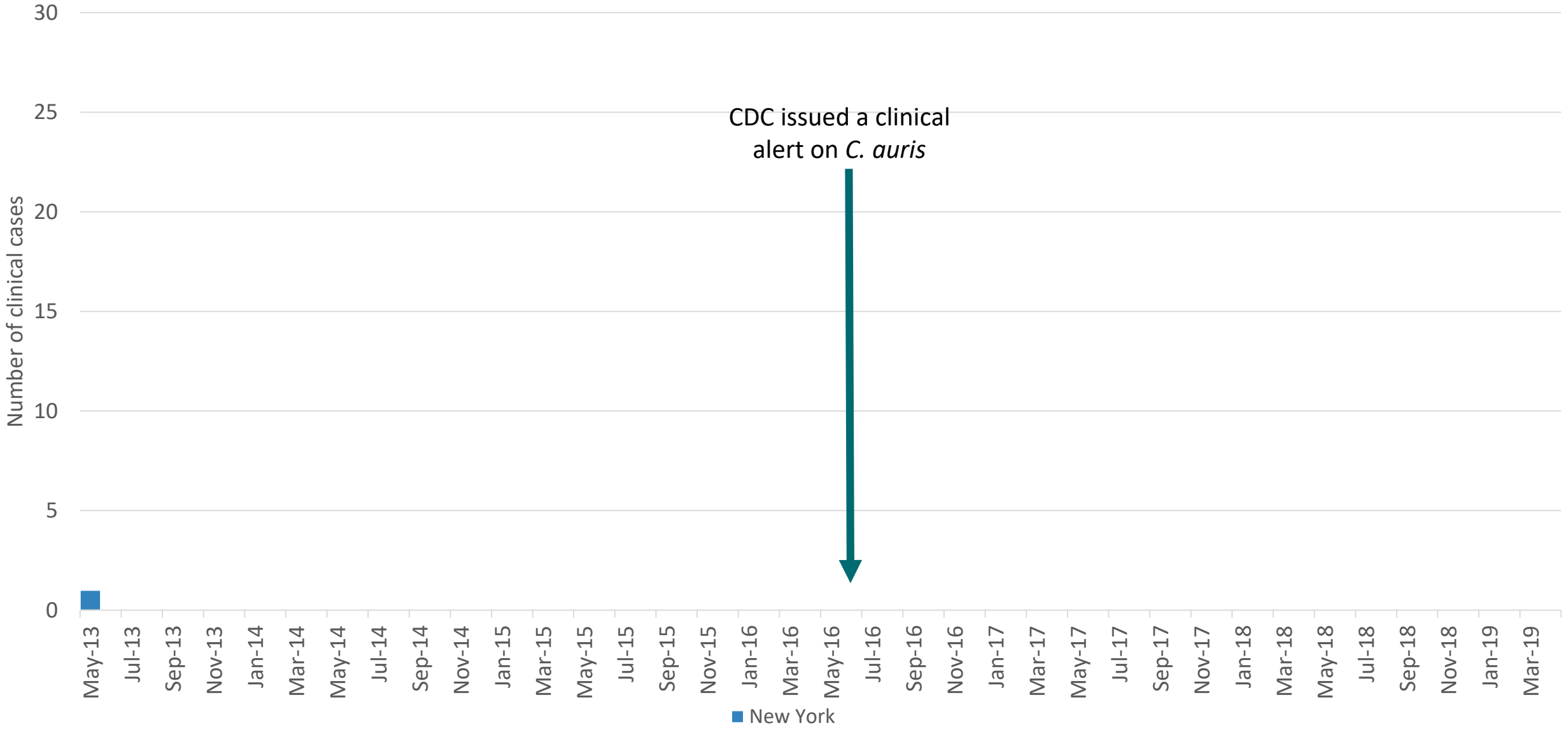
Pre – April 2016 (n=154)

Post April 2016 (n=154)

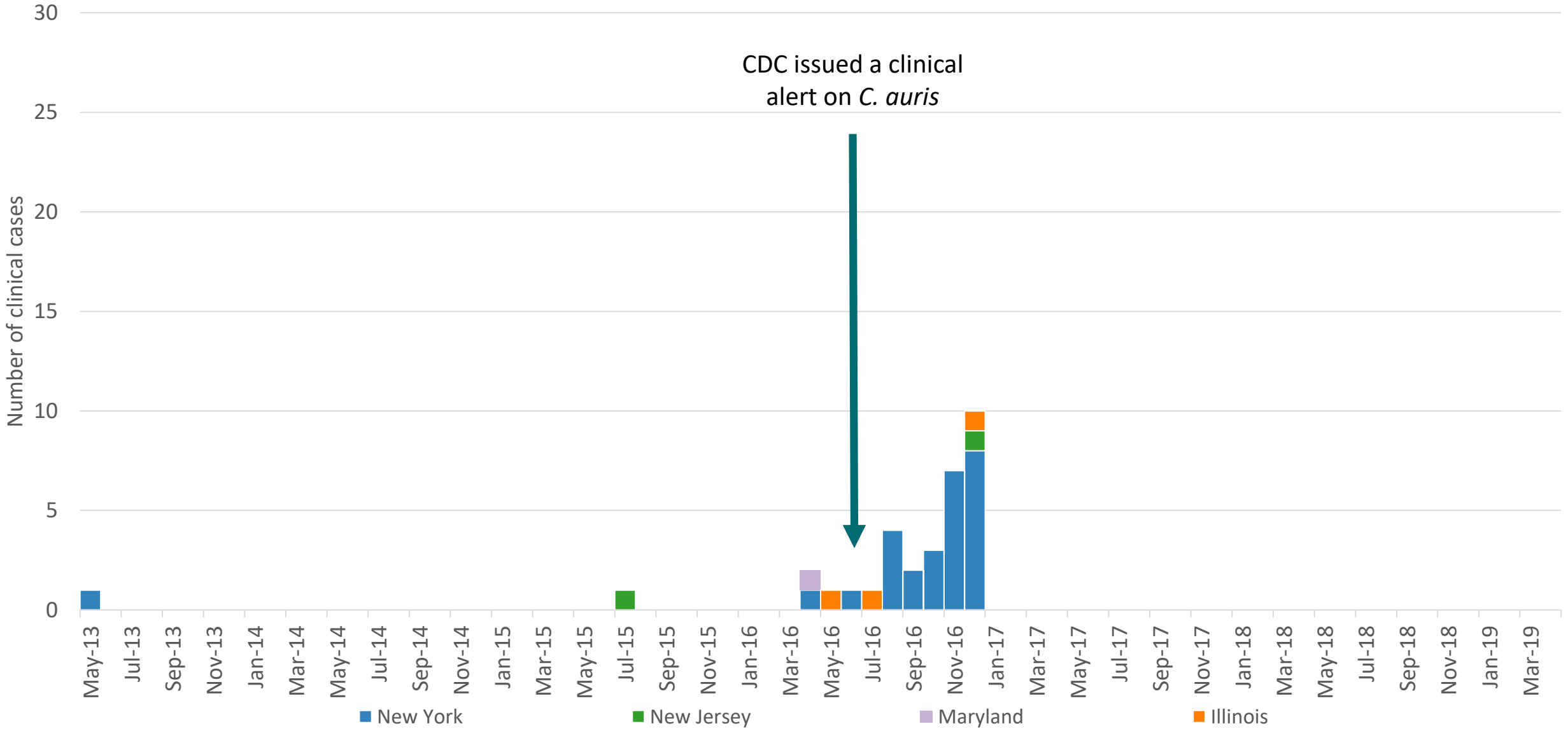


https://www.eccmidlive.org/#resources/how-should-we-manage-the-c-auris-outbreak

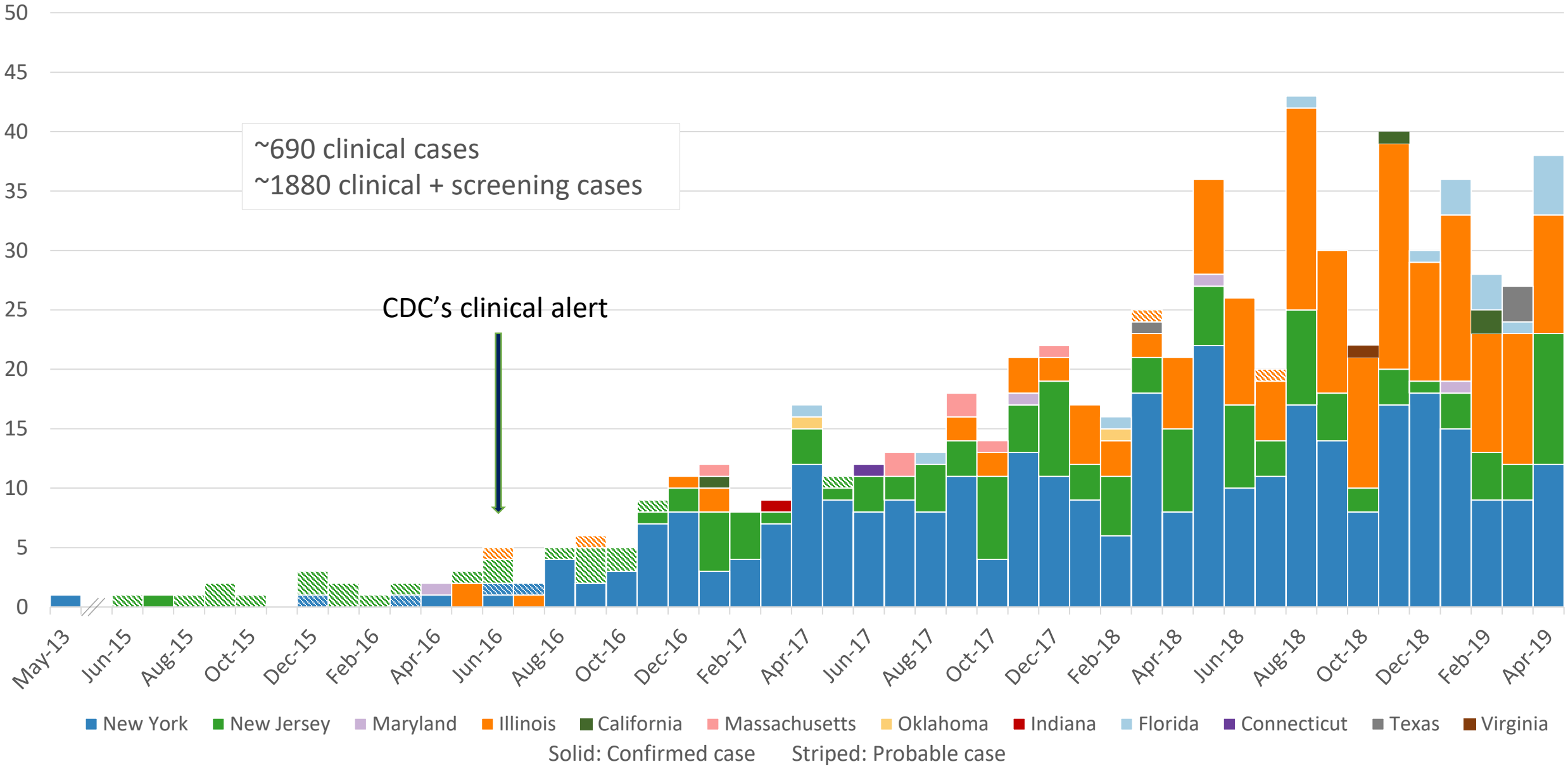
C. auris clinical cases reported by state — United States, June 2016



C. auris clinical cases reported by state — United States, 2013–December 2016



C. auris clinical cases reported by state of collection— United States, 2013–April 2019



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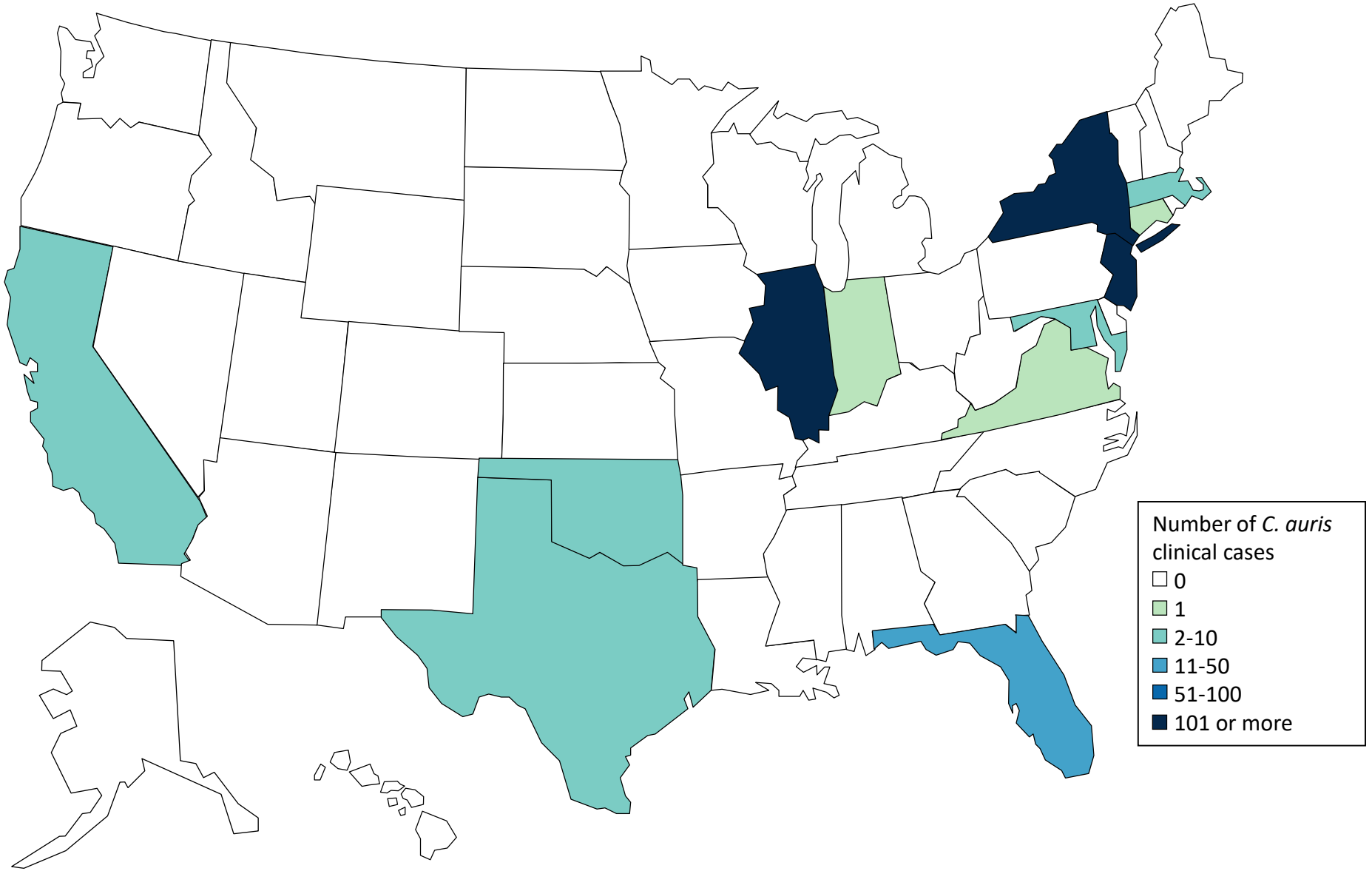


https://www.cdc.gov/fungal/candida-auris/tracking-c-auris.html

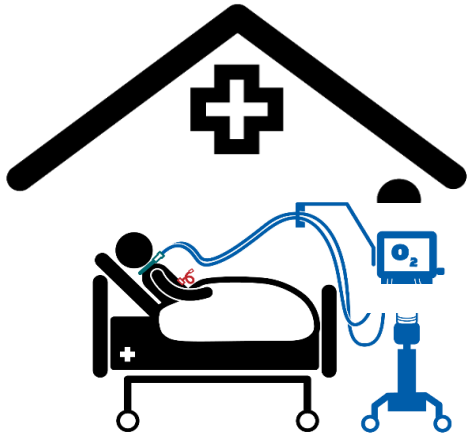
Risk factors for *C. auris*

Typically affects the sickest of the sick

- Tracheostomies
- Ventilator-dependent
- Colonized with other multidrug-resistant organisms
- Recently received antibiotics and antifungals
- Not a threat to general public or healthy individuals

Stays in certain types of post-acute care facilities is a major risk factor: vSNFs and LTACHs

C. auris prevalence in nursing home units with ventilator beds



7.7%

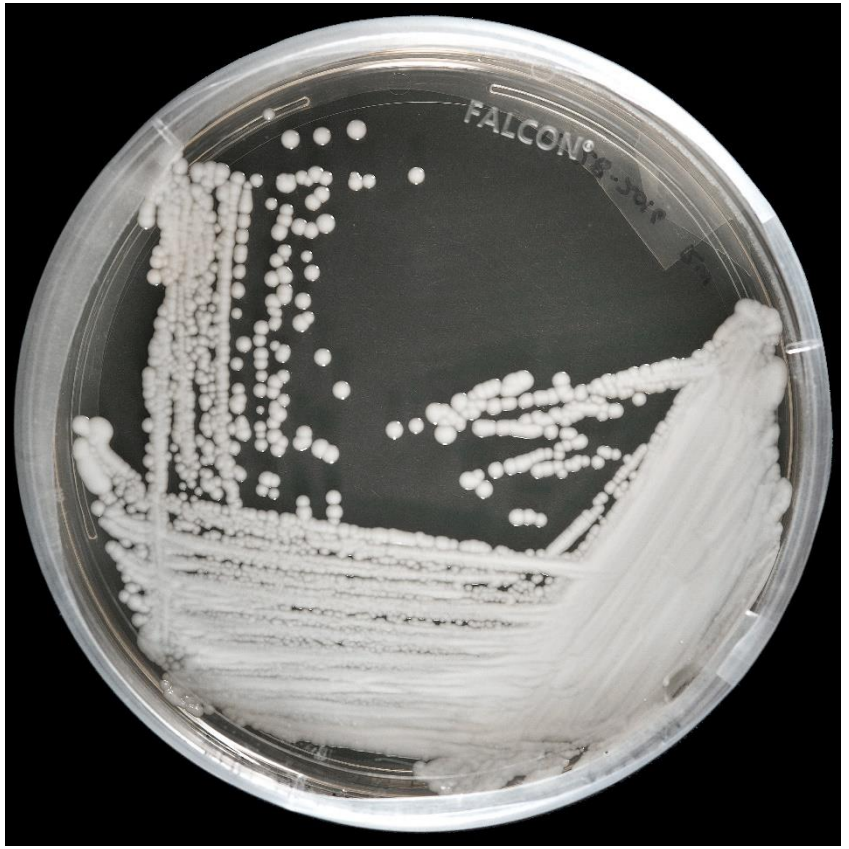
C. auris prevalence in regular nursing homes

0.7%

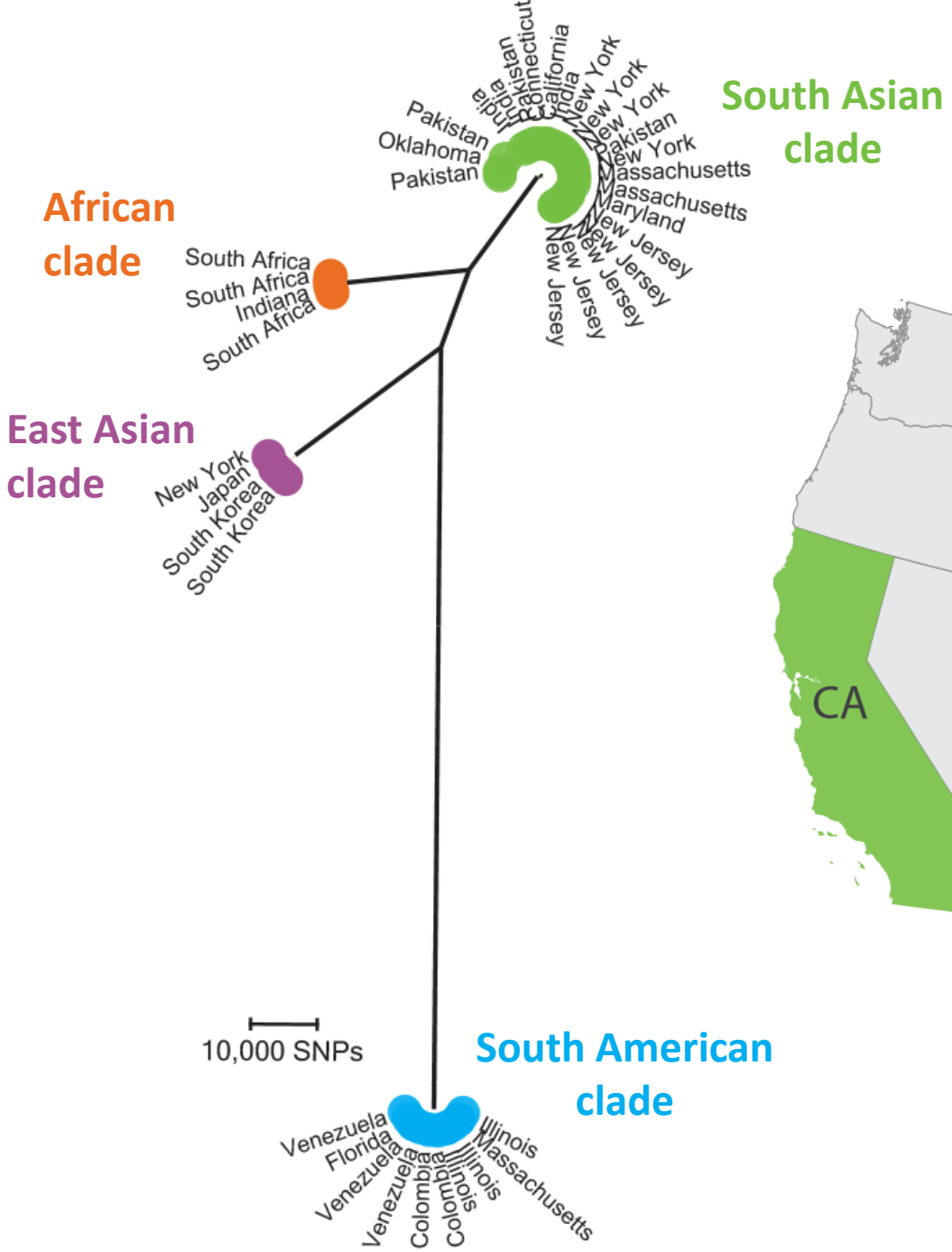
Adams EH, Quinn M, Ostrowsky B, et al. The Value Added from Candida auris Point Prevalence and Environmental Studies in New York State. 2018. Available at: https://idsa.confex.com/idsa/2018/webprogram/Paper72423.html.

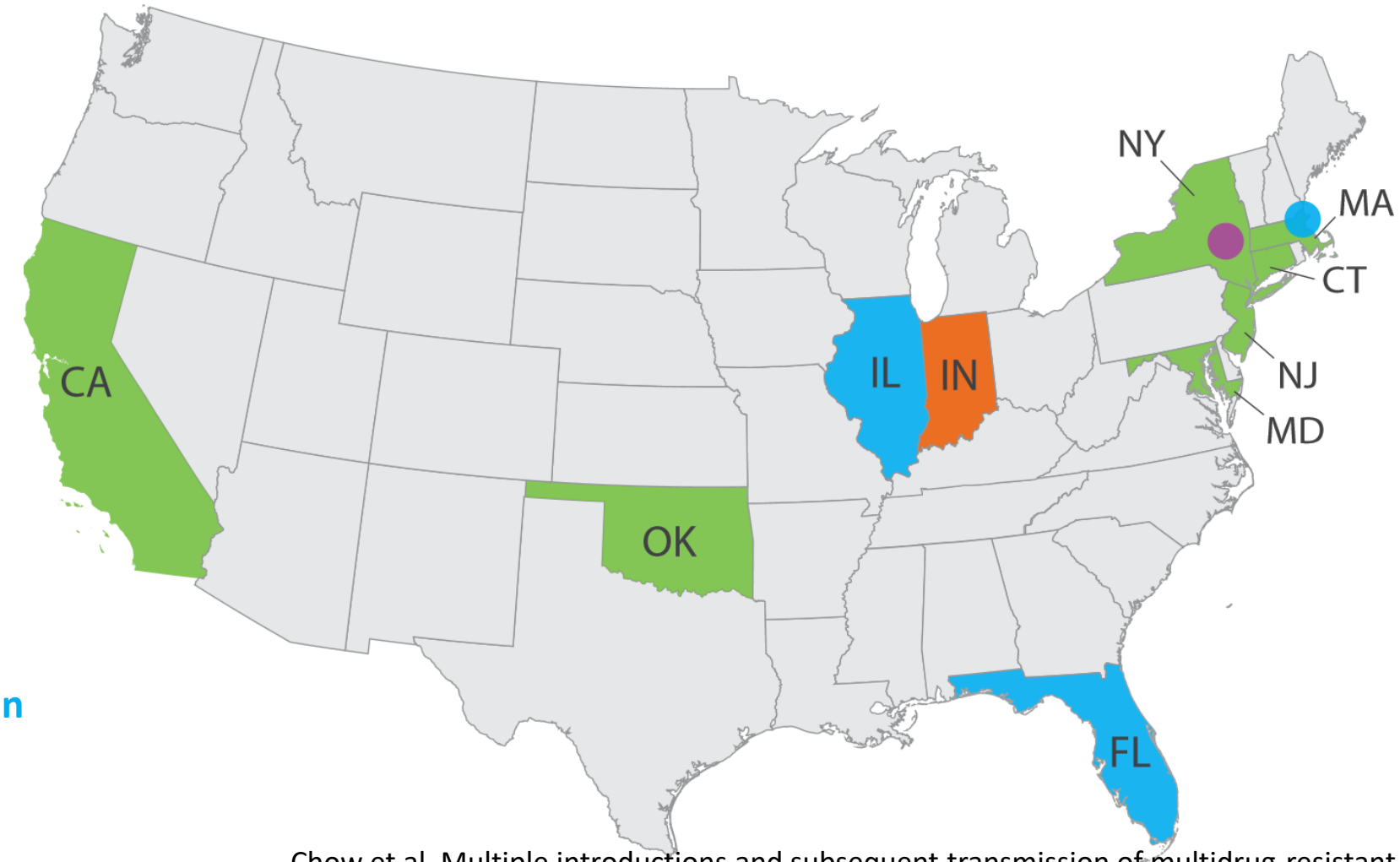
Healthcare abroad is risk factor for *C. auris*

- Patients from India, Pakistan, South Africa, Kenya, Venezuela, UAE, Kuwait
- Identified weeks to two years after hospitalization in that country
- Whole genome sequencing showed isolates were related to those from the countries where patients received healthcare



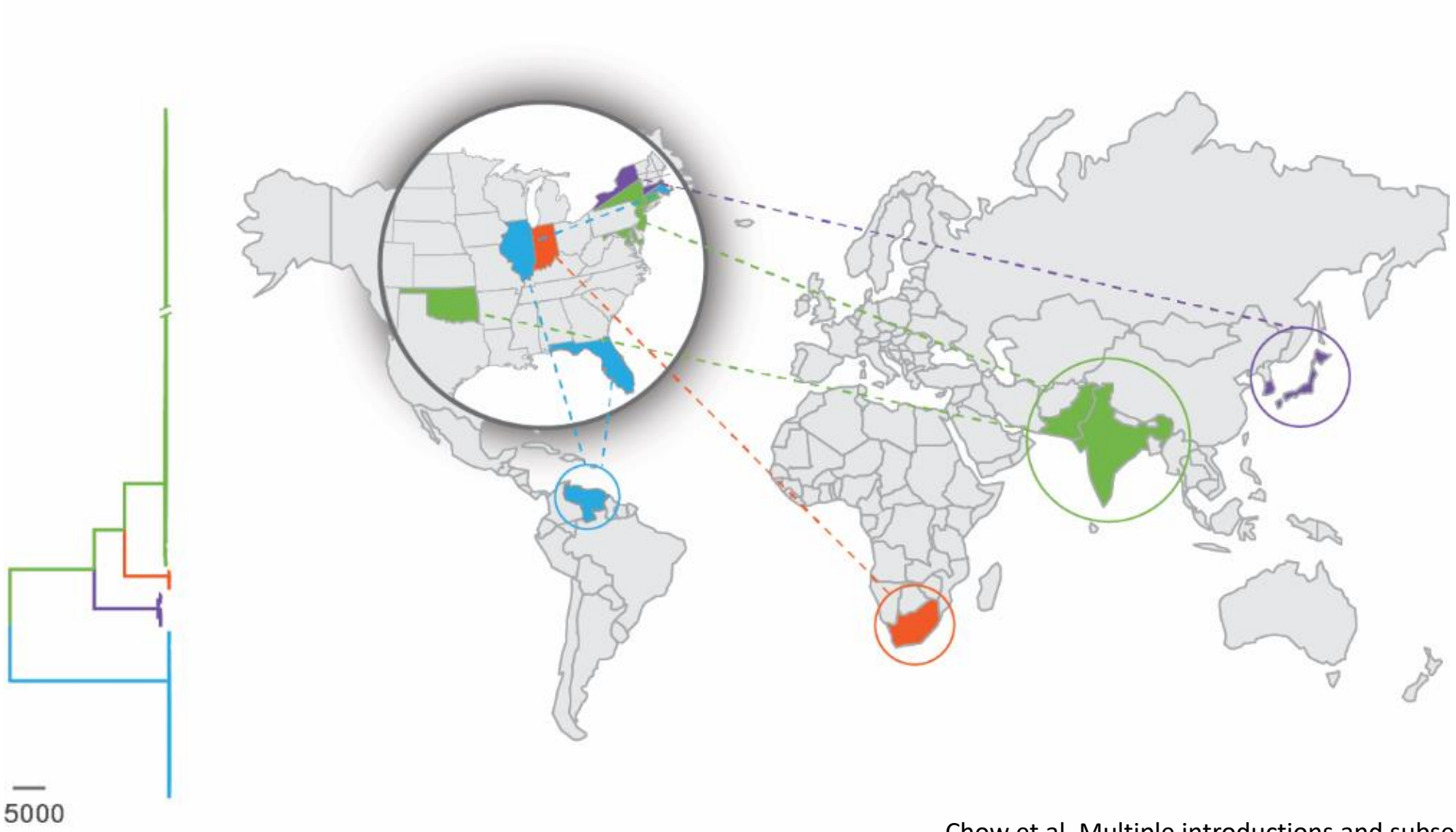
Isolates from U.S cases cluster to all four *C. auris* clades





Chow et al, Multiple introductions and subsequent transmission of multidrug-resistant Candida auris in the USA: a molecular epidemiological survey; Lancet ID, Oct 2018

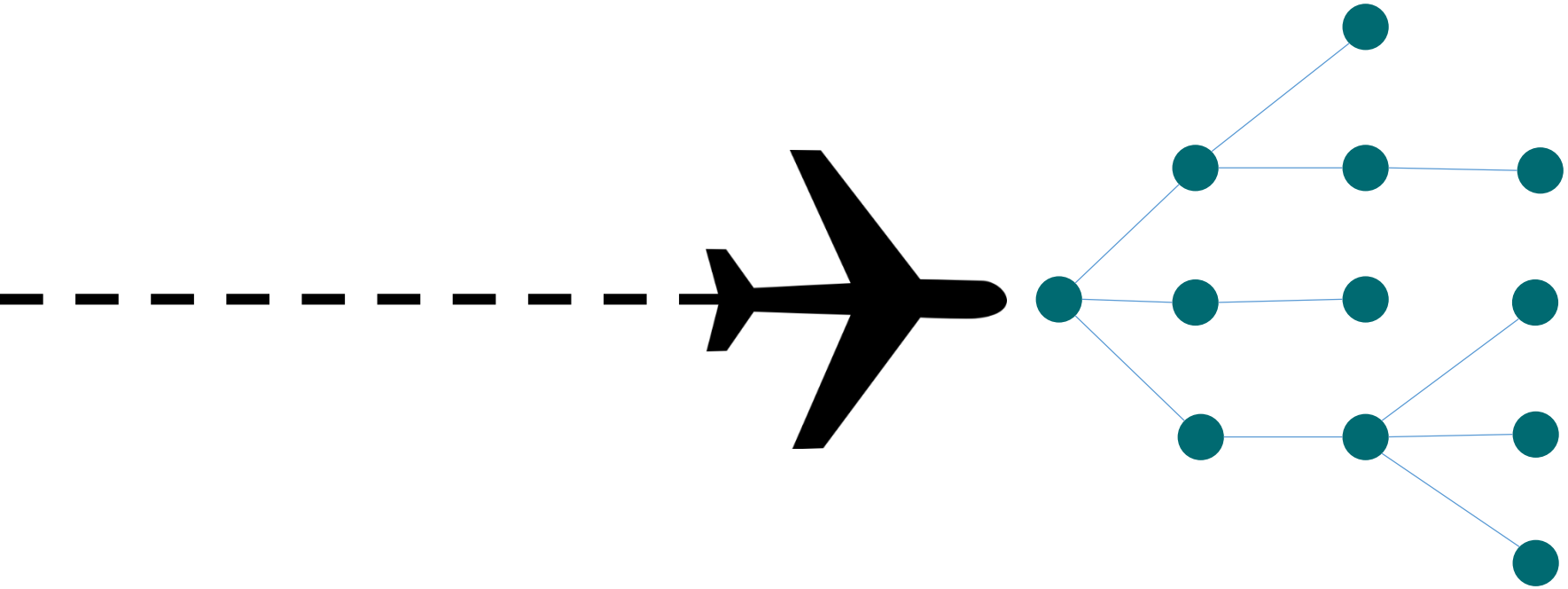
Importation to the U.S.



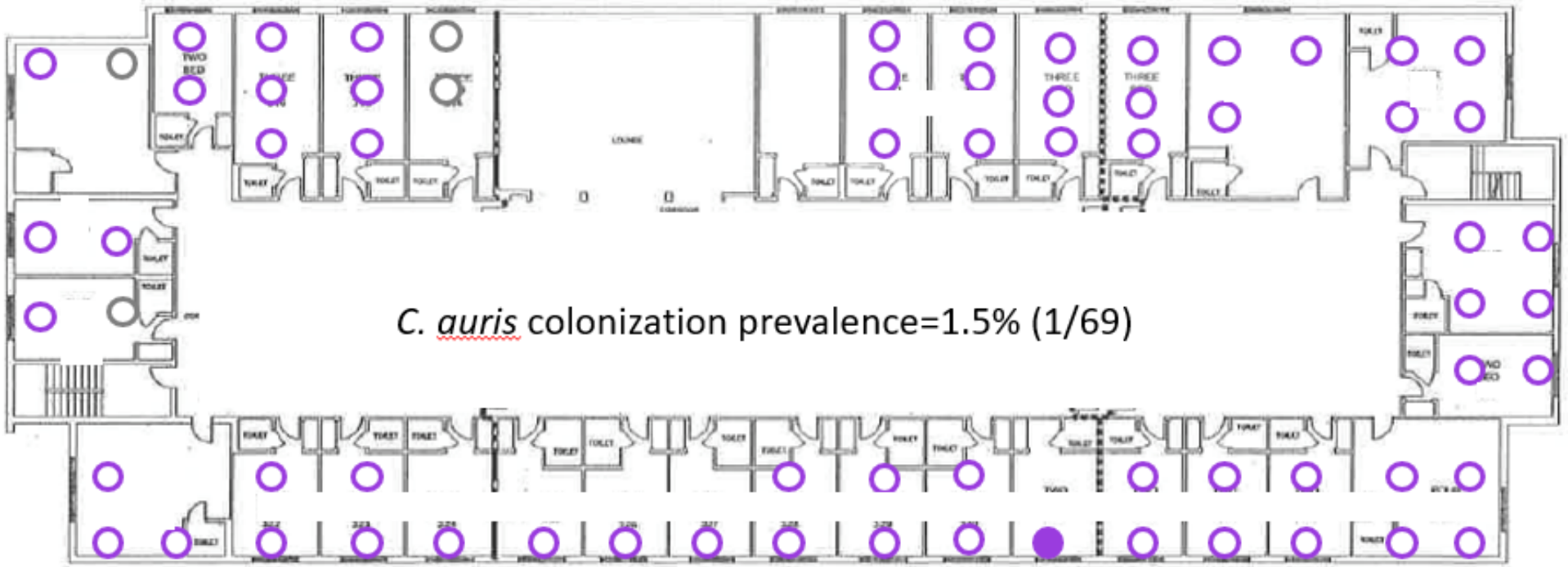
Chow et al, Multiple introductions and subsequent transmission of multidrug-resistant Candida auris in the USA: a molecular epidemiological survey; Lancet ID, Oct 2018

Spreads after introductions from abroad

- Majority of cases don’t have direct links to healthcare abroad
- Cases are a result of introductions from abroad <u>followed by local transmission</u>



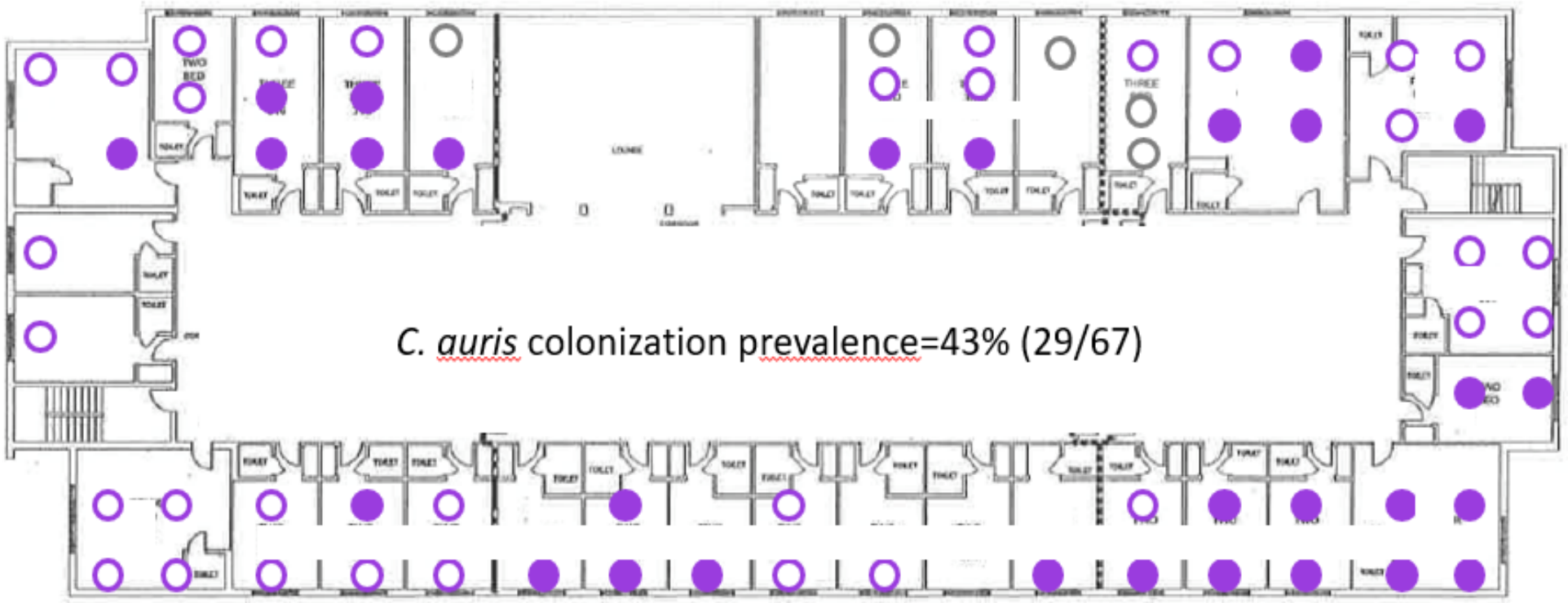
vSNF A Ventilator/Trach Floor
March 2017 *C. auris* PPS Results



- *C. auris* positive
- Screened negative for *C. auris*
- Not tested for *C. auris* (refused or not in room)

Slide courtesy of Chicago Department of Public Health.

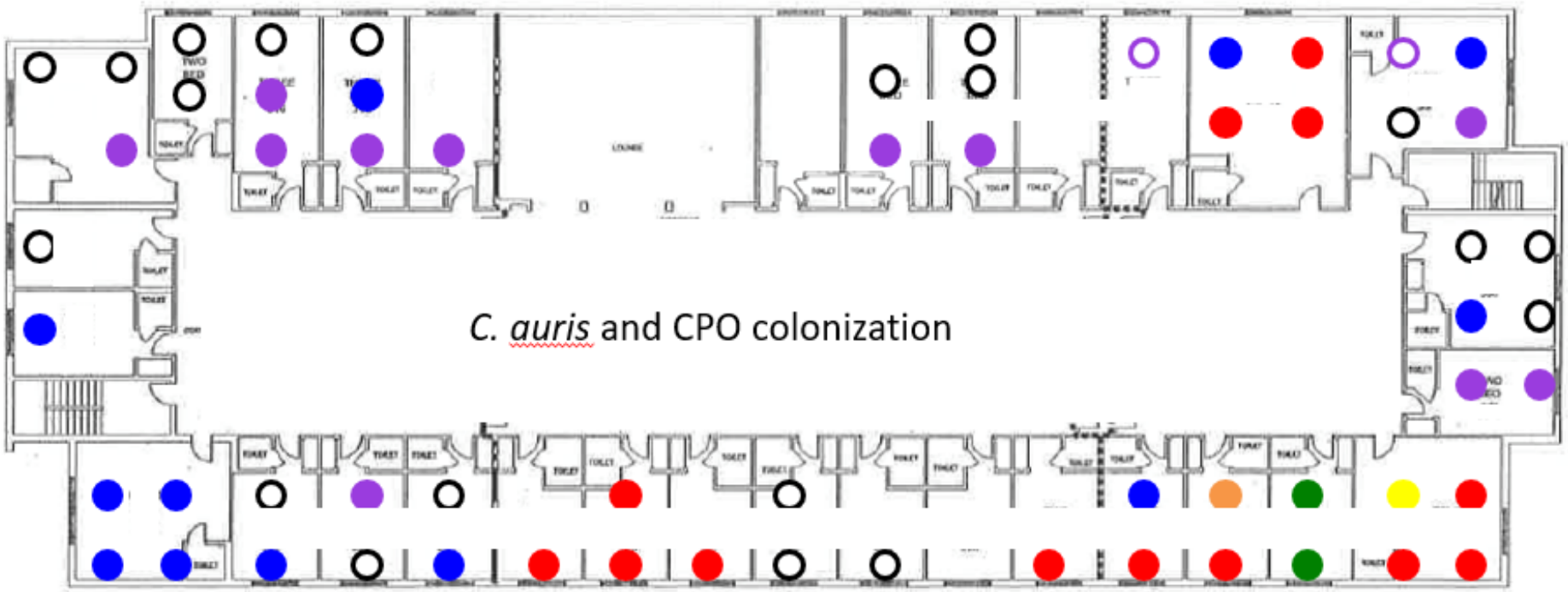
vSNF A Ventilator/Trach Floor
January 2018 *C. auris* PPS Results



- *C. auris* positive
- Screened negative for *C. auris*
- Not tested for *C. auris* (refused or not in room)

Slide courtesy of Chicago Department of Public Health.

vSNF A Ventilator/Trach Floor
January 2018 CPO and *C. auris* PPS Results



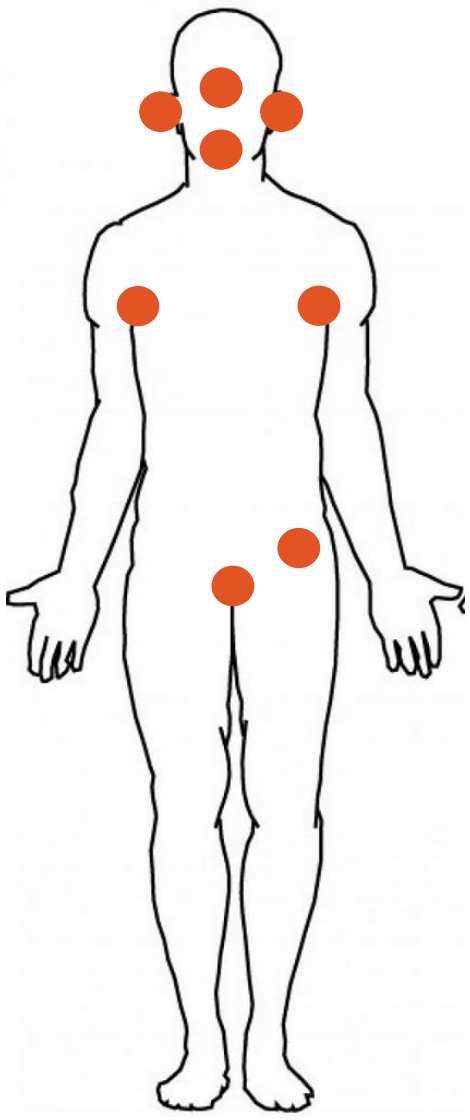
- *C. auris*
- *C. auris* and KPC
- KPC or CRE with unknown mechanism of resistance
- *C . auris*, KPC, and NDM
- *C. auris*, VIM-CRPA, and KPC
- *C. auris* and KPC-CRPA

- Screened negative for *C. auris*, but not tested for CRE
- Screened negative for CRE and *C. auris*

Slide courtesy of Chicago Department of Public Health.

Patients are often colonized indefinitely

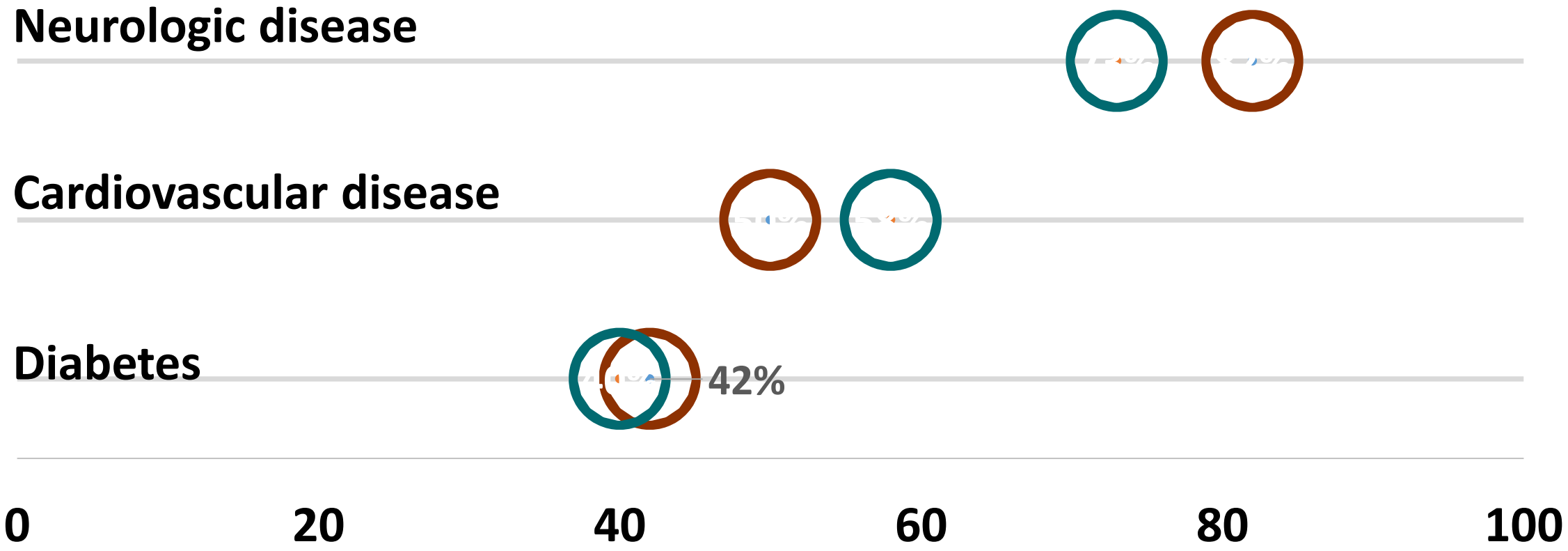
- Primarily on skin, but nares and other body sites also can become colonized
- Persistent, for many months
- No currently known decolonization strategies



- Leads to:
  - Invasive infection
  - Transmission to others

Case control study for *C. auris* colonization risk factors in vSNFs in NY

Both cases and controls had lots of comorbidities

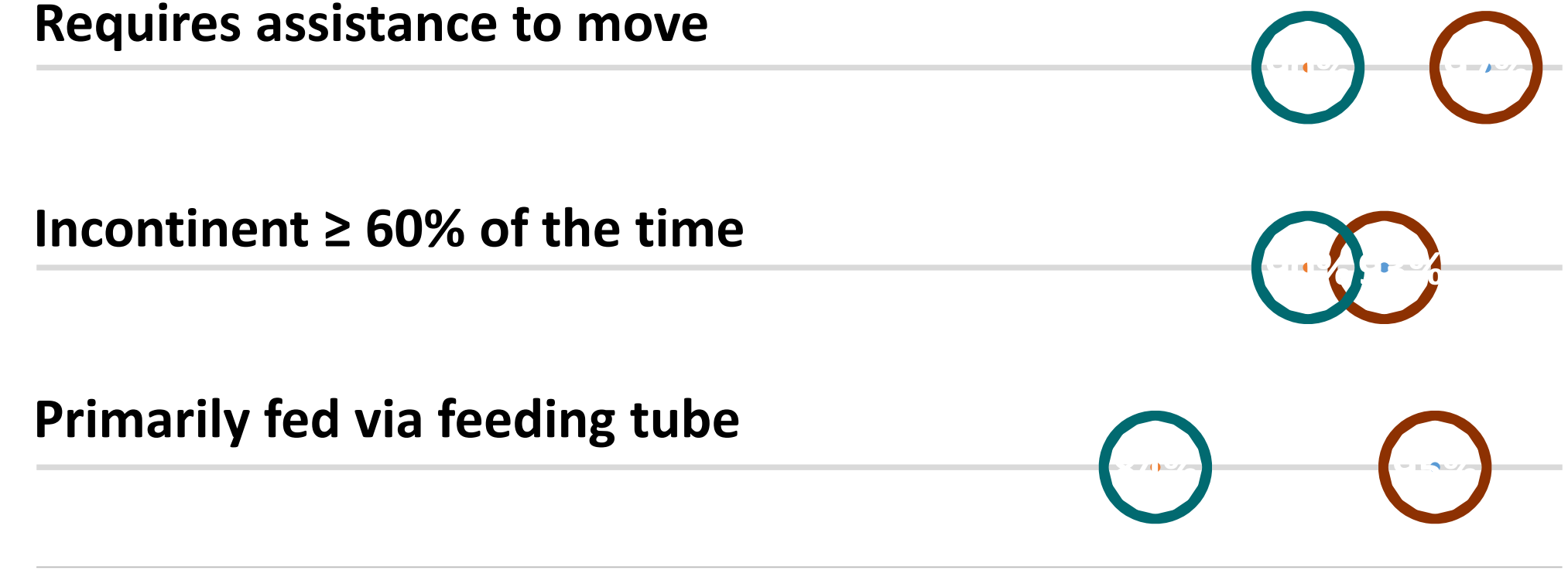


Both cases and controls required assistance to perform activities of daily living (ADLs).

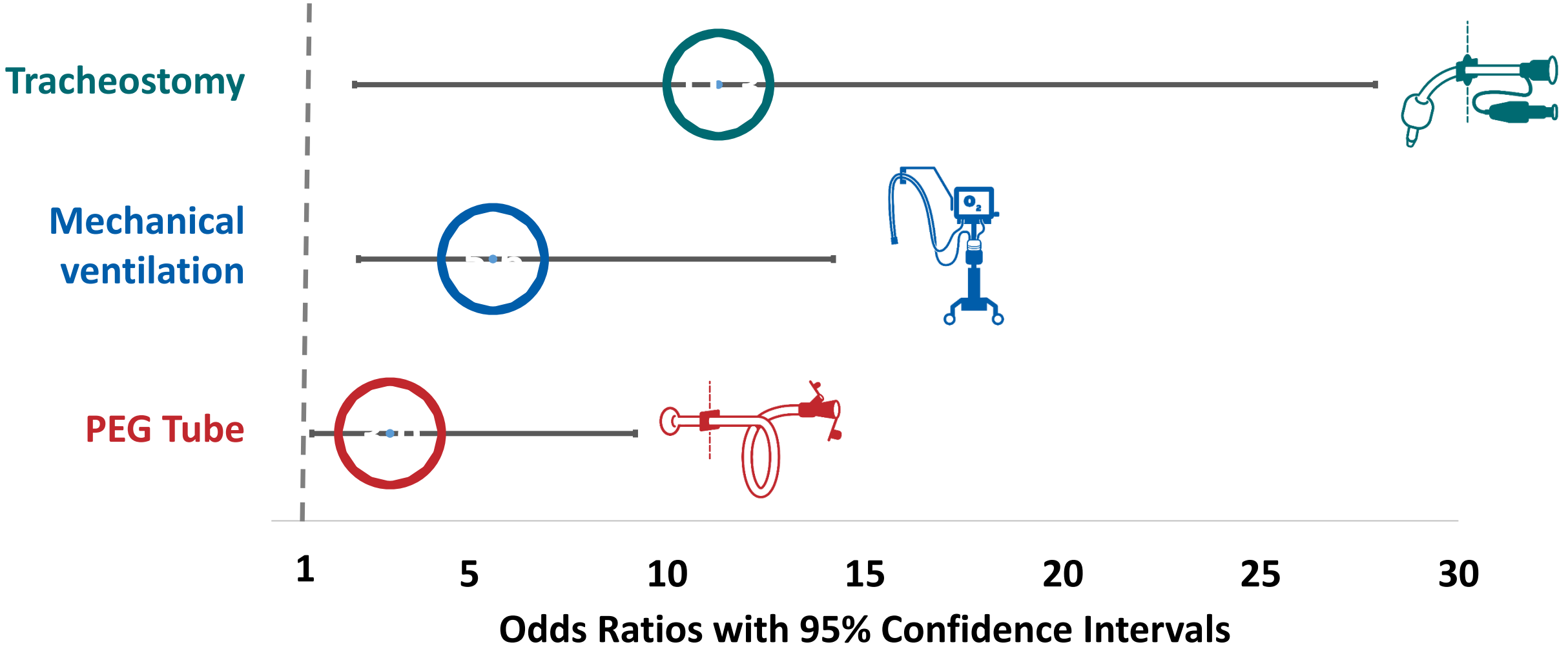
Requires assistance to move

Incontinent ≥ 60% of the time

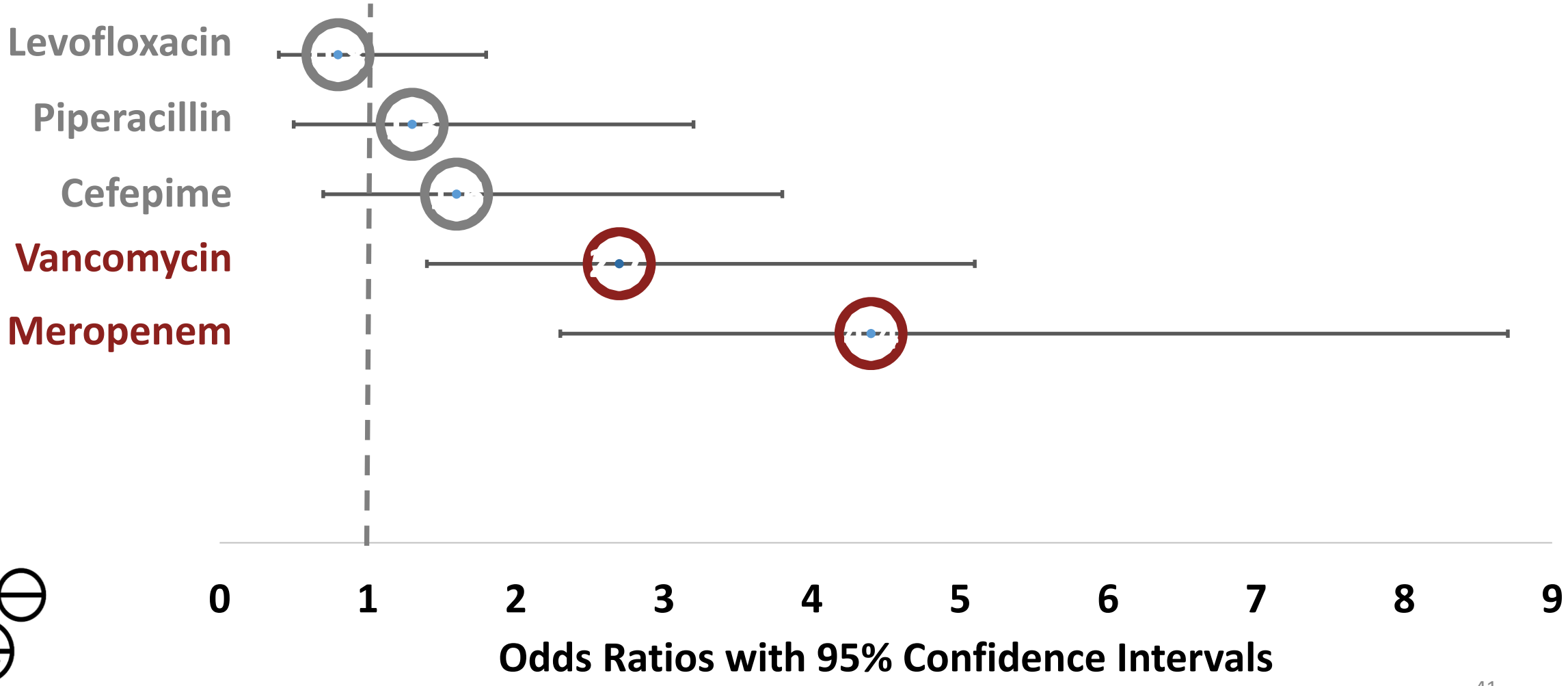
Primarily fed via feeding tube



Tracheostomy, ventilation, and PEG tubes were associated with colonization.



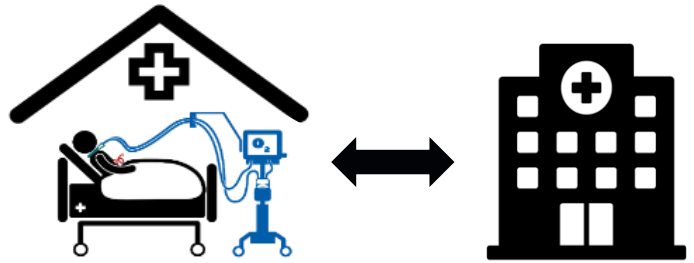
Certain broad-spectrum antibiotics were associated with *C. auris* colonization.

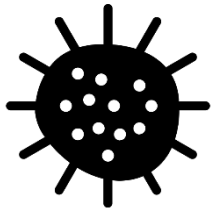


Facility transfers and presence of an MDRO were associated with *C. auris* colonization.

≥ 1 ACH transfer in the 6 months prior to PPS

Had an MDRO in the 90 days prior to PPS

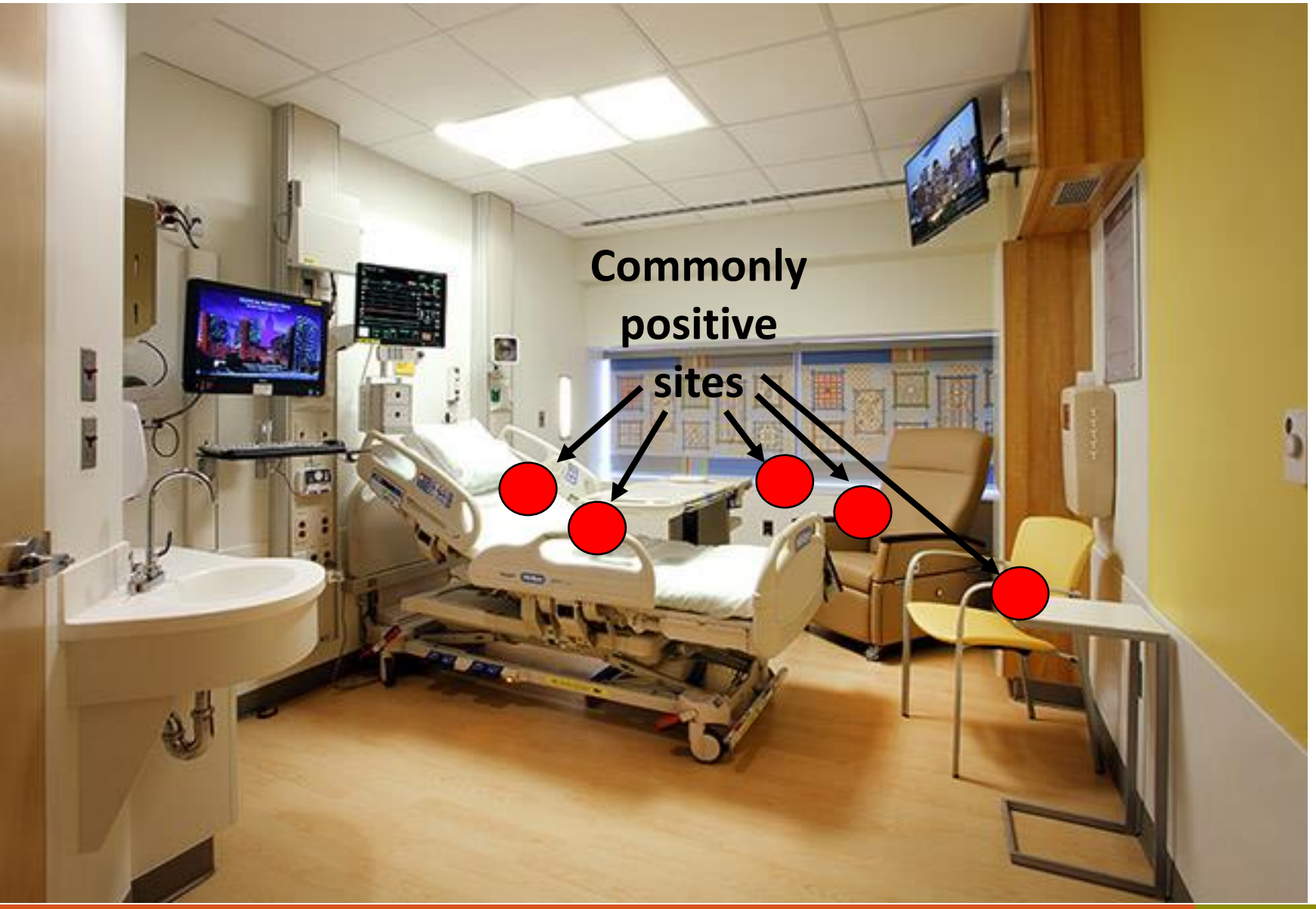




0 1 2 3 4 5 6 7 8

Odds Ratios with 95% Confidence Intervals

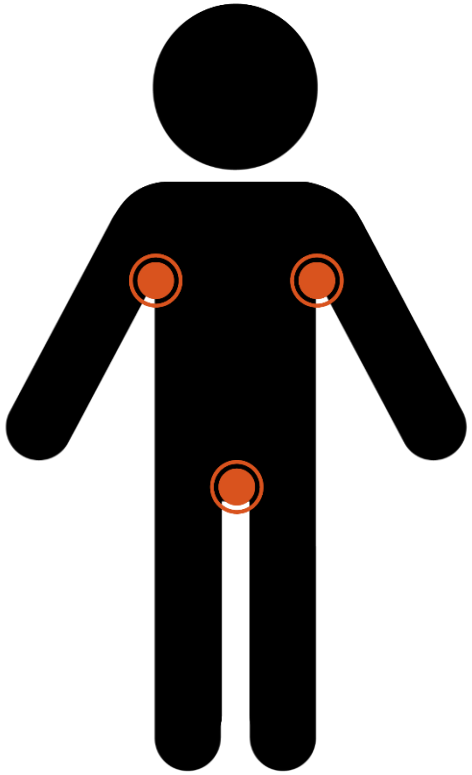
C. auris persists in the environment

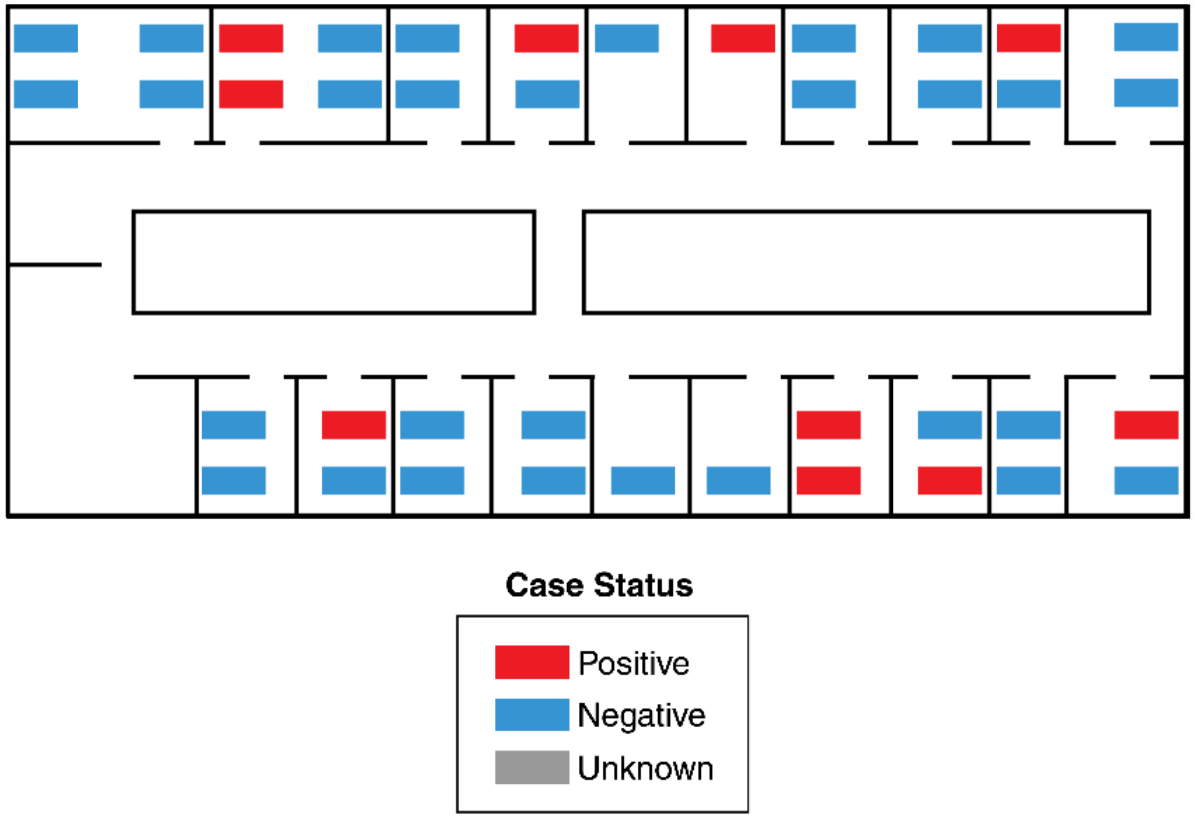


- Can survive over a month
- Some common disinfectants (quaternary ammonia compounds) don’t work

Mobile equipment has been heavily implicated in transmission

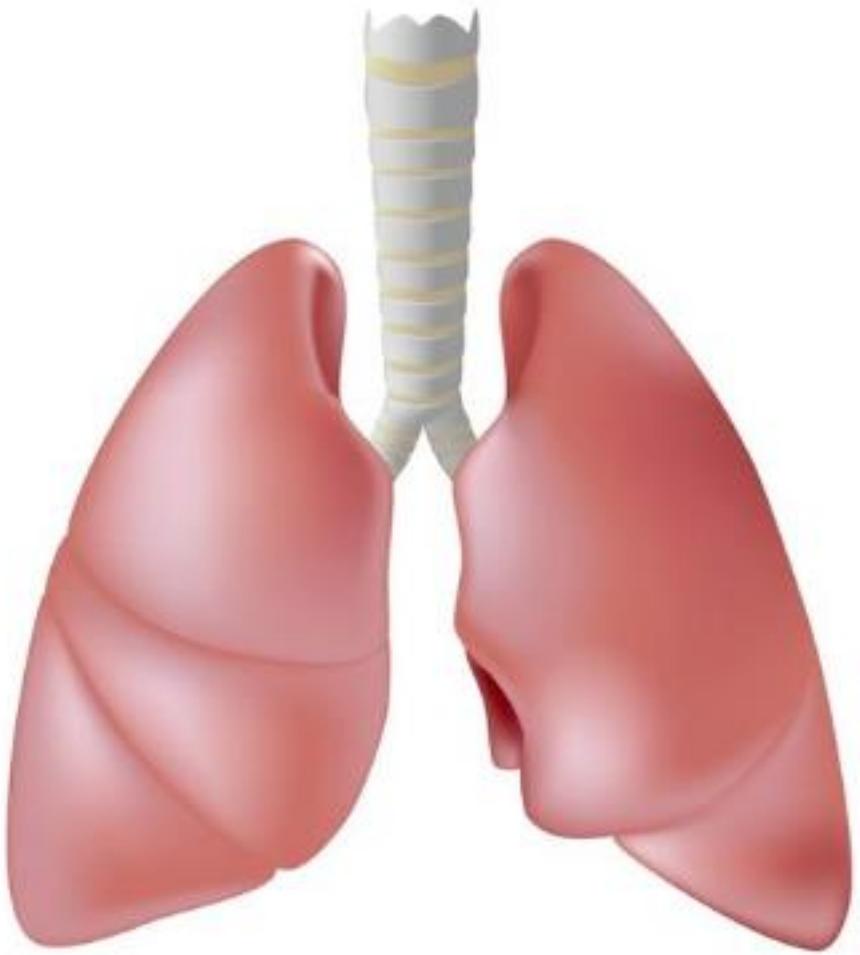
C. auris colonization doesn't just get passed to roommates—others on the unit also seem to be at risk





Transmission Through Organ Transplantation

- *C. auris* cultured from lungs shortly after transplant in Massachusetts
- No clear evidence of invasive *Candida* infection
- Donor lungs found to have had *C. auris* pre-transplant
- Donor from **Illinois**
- Isolate nearly identical to other Illinois isolates



Azar et al, Donor derived transmission of Candida auris during lung transplantation. CID, 2017

Identification

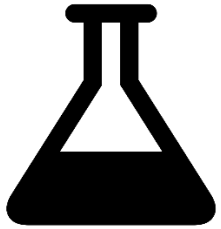
C. auris detection has been challenging

But, its getting better!

--Awareness of the organism
--Improved access to MALDI-TOF
--Ability to confirm at reference and public health labs

Update on lab methods for detecting *C. auris*

- FDA approvals
  - VITEK MS MALDI
  - Bruker Biotyper MALDI
  - GenMark ePlex BCID-FP panel blood culture test
- VITEK 2 8.01 update
- rt-PCR



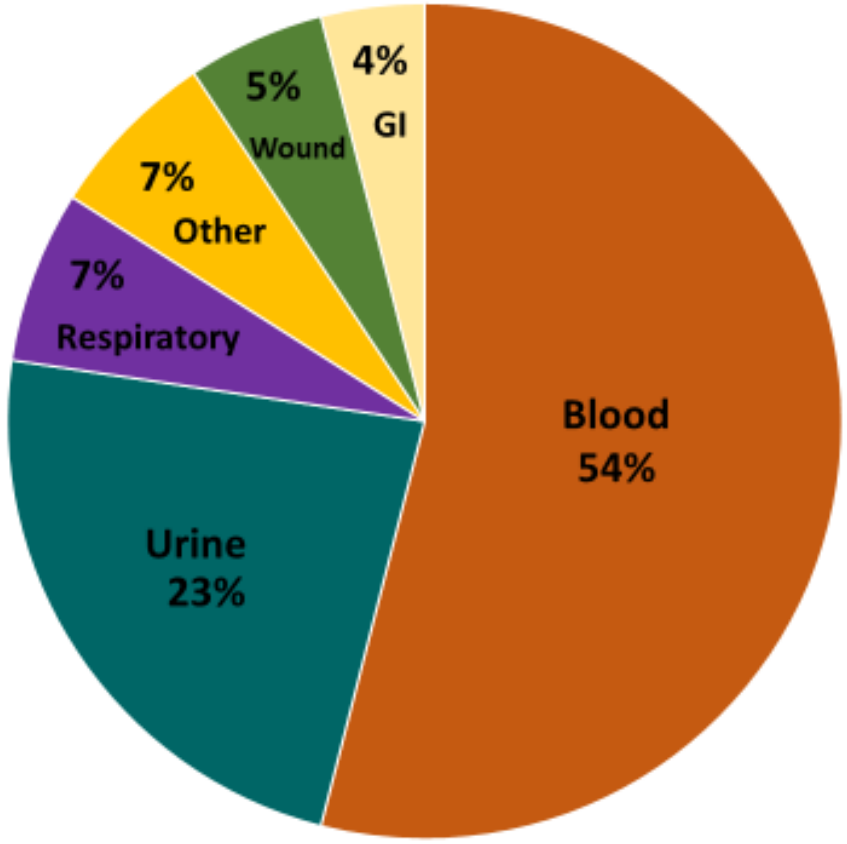
Misidentification

Identification Method	Organism *C. auris* can be misidentified as
Vitek 2 YST	*Candida haemulonii* *Candida duobushaemulonii*
API 20C	*Rhodotorula glutinis* (characteristic red color not present) *Candida sake*
BD Phoenix yeast identification system	*Candida haemulonii* *Candida catenulata*
MicroScan	*Candida famata* *Candida guilliermondii*[a] *Candida lusitaniae*[a] *Candida parapsilosis*[a]
RapID Yeast Plus	*Candida parapsilosis*[a]

Challenges with identification

- Yeast not determined to species level in many labs, except by request
  - Sterile site isolates may only be performed by request
  - Species from non-sterile isolates often not identified

Initial culture site of *C. auris* clinical cases



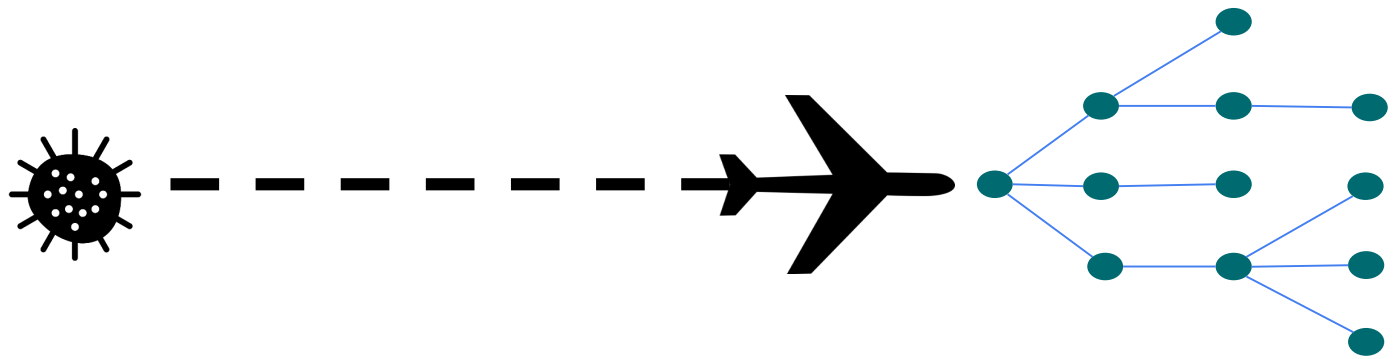
Early detection strategies

Candida from urine and other non-sterile body sites

- Yeast from urine usually tossed out because not considered an infection
- Long-term acute care hospital network decided to determine species of any yeast identified in urine
- Within 5 months, detected first case of *C. auris* in their region

Screen patients who have a history of hospitalizations abroad in the last 12 months

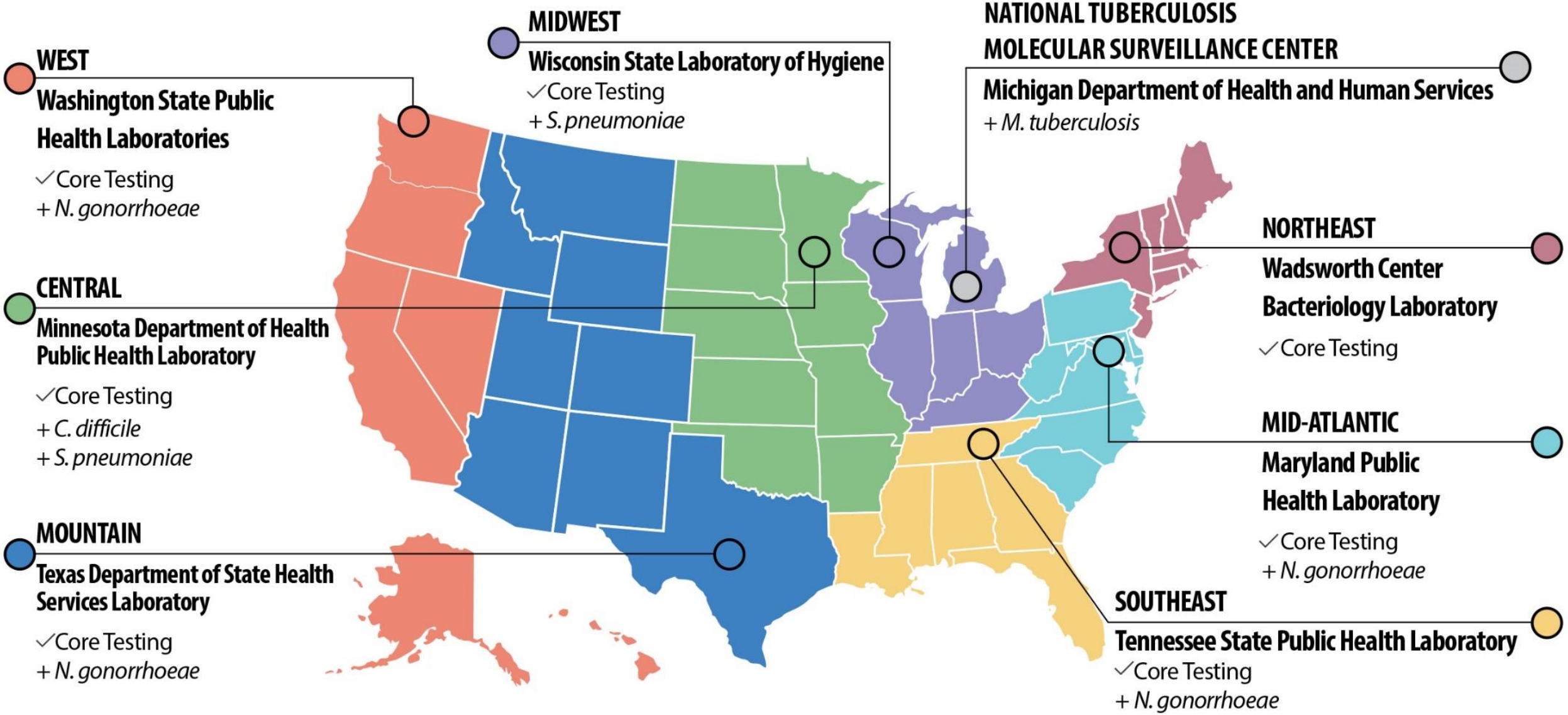
- Handful of patients have been screened
- One patient with hospitalizations in Kenya was found to be colonized with *C. auris.*
- CDC recommends screening anyone with hospitalization outside the U.S. in the last year, especially if in a country with known *C. auris* cases or they also have a carbapenamase-producing organism detected



Colonization screening presents challenges

- PCR or culture-based methods are available through CDC and public health labs
- Few clinical labs now conducting screening using PCR

ARLN Labs – *Candida auris* identification services available



C. auris nationally notifiable

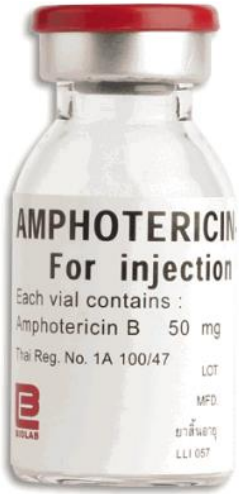
Management of *C. auris*

THREE CLASSES OF ANTIFUNGALS

1

Azoles

2



Polyenes

3

Echinocandins

Resistance in the U.S.

1

87.6%
Azoles

2

33.7%
Polyenes

3

1.7%
Echinocandins

- 33% multidrug resistant
- 2 pan-resistance found in 2019

CDC *C. auris* management guidance

- Echinocandins are first line treatment
- AFST on every isolate
- Repeat cultures until documented clearance for invasive sites

Pan-resistance – all three classes

- CDC-confirmed pan-resistant *C. auris* cases in NY
- Cases were unrelated
- Developed resistance on echinocandin treatment
  - already resistant to fluconazole and amphotericin B
- No transmission of resistance seen
- Pan-resistance has also been reported from a few other countries

Good News: New Antifungals

Company	Drug	Class or Activity
Cidara	rezafungin	Echinocandin (long half life)
Synexis	**Ibrexafungerp**	**Echinocandin-like (orally available)**
Viamet	VT-1598	Lanosterol demethylase inhibitor
Viamet	VT-1161	Lanosterol demethylase inhibitor
Amplyx	**APX001**	**New class – Gwt1 inhibitor**
Vical	VL-2397	Novel - proprietary

Clinical Trials – New Drugs

- APX001 – in phase 2 candidemia trials, including *C. auris*
  - Available for emergency use

- Ibrexafungerp – phase 3 clinical trial for *C. auris* (CARES)
  - Available for emergency use

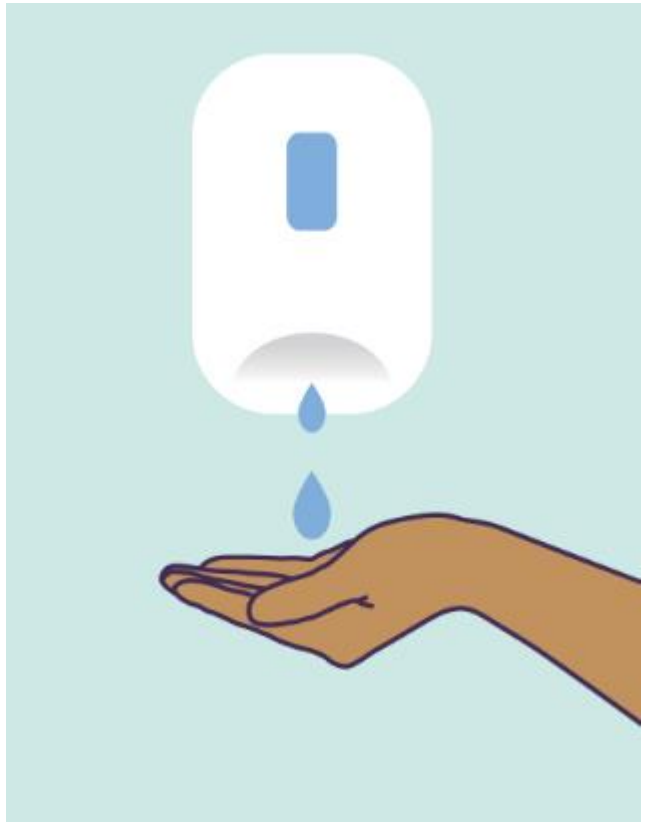
Decolonization

- Active area of investigation

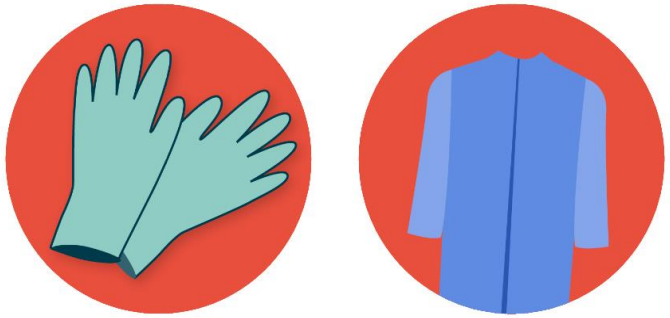
Antibiotic stewardship may be important in the prevention of *C. auris* colonization.

Infection prevention

Facility Level Prevention Strategies: Back to Basics



Hand Hygiene

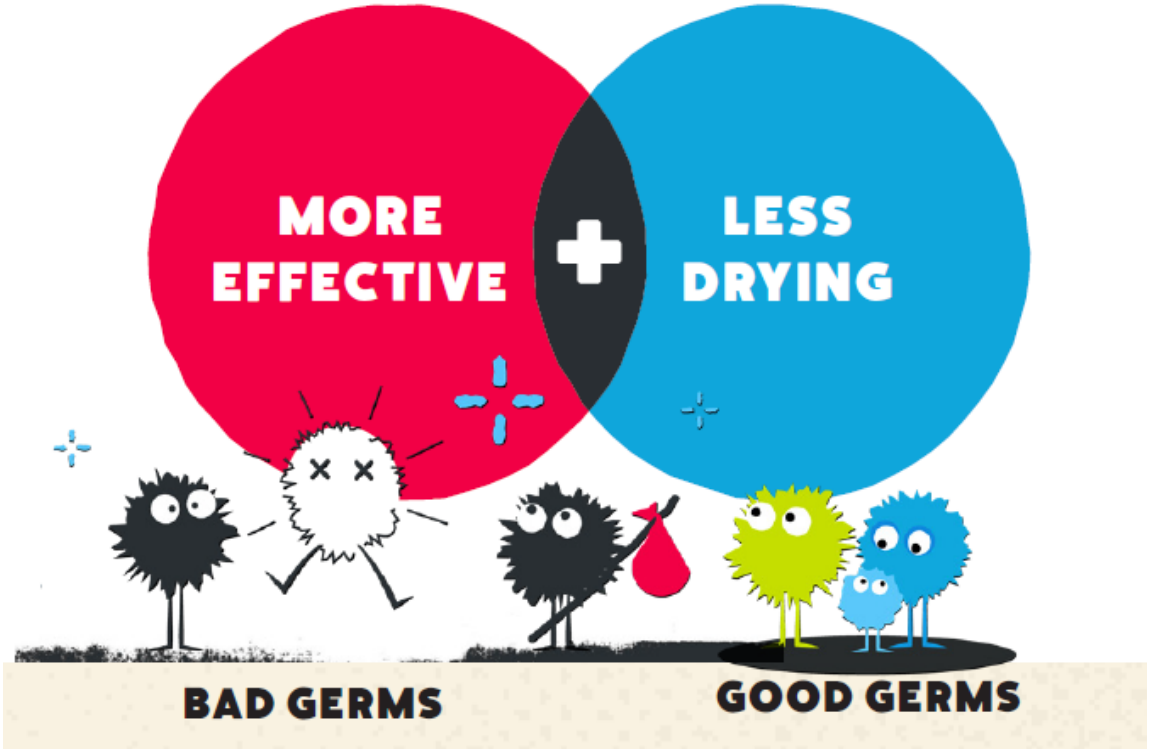


Personal Protective Equipment & Precautions

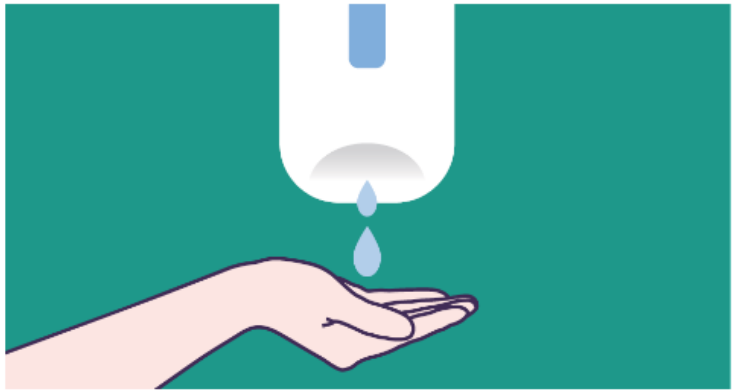
Environmental Cleaning & Disinfection

Hand Hygiene

Alcohol-based hand rub is preferred over soap and water except when hands are visibly soiled.



Using Alcohol-Based Hand Rub (ABHR)



Apply product to one hand.

Rub hands together, covering all surfaces, until hands and fingers feel dry.

Process should take about 20 seconds.

Contact Precautions are recommended for patients colonized/infected with *C. auris*

- Gown and gloves must be worn on every room entry

Environmental Cleaning and Disinfection

- Product must be active against *C. difficile* spores

- List K: EPA's Registered Antimicrobial Products Effective against *C. difficile* Spores: https://www.epa.gov/sites/production/files/2018-01/documents/2018.10.01.listk_.pdf

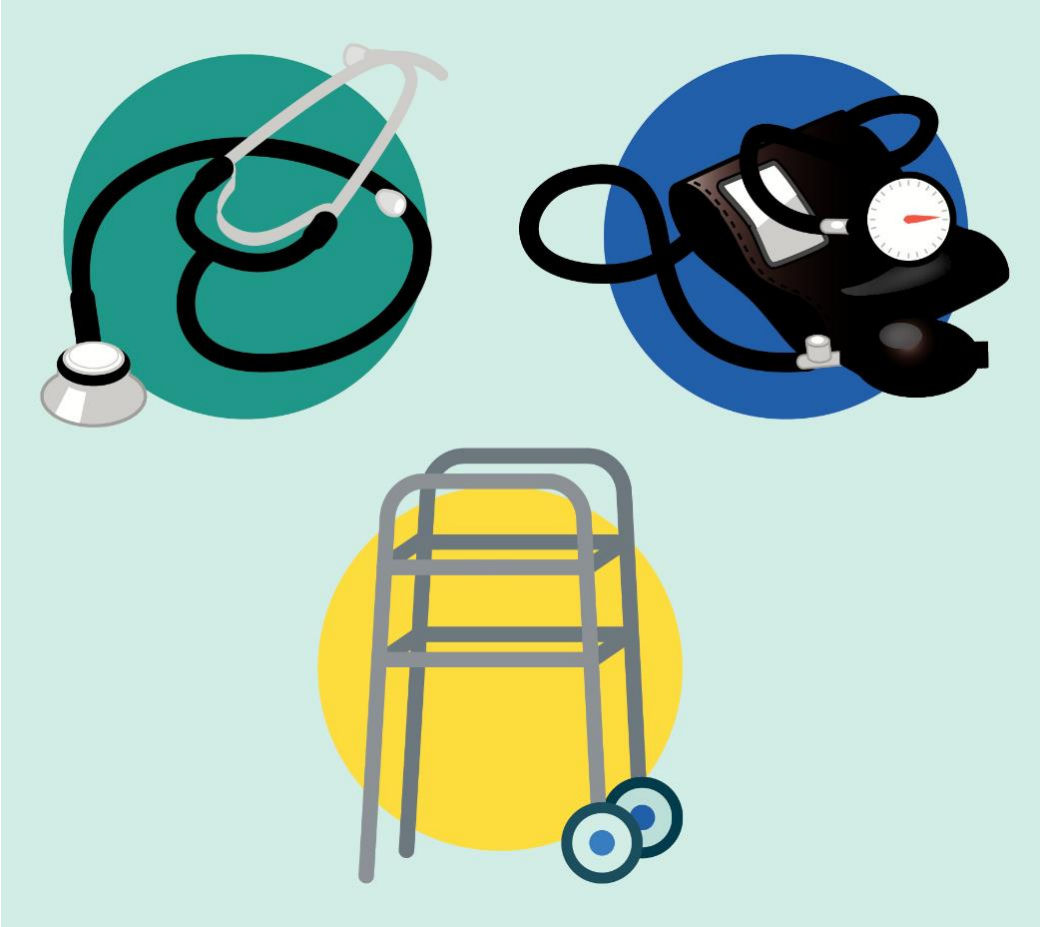
- Consider using across entire unit or facility if multiple residents screen positive for *C. auris*

Focus on High-Touch Areas

- Bed and chair rails
- Sink and toilet
- Bedside tables
- Call light
- Remote control and phone

Cleaning and Disinfection of Shared Medical Equipment

- Shared medical equipment cleaned and disinfected prior to use with another resident
- Easy access to cleaning/disinfectant products for all staff
- “Who cleans what?”



Communication at time of Transfer

Inter-facility Infection Control Transfer Form

This form must be filled out for transfer to accepting facility with information communicated prior to or with transfer.

Please attach copies of latest culture reports with susceptibilities if available.

Sending Healthcare Facility:

Patient/Resident Last Name	First Name	Date of Birth	Medical Record Number
		/ /	

Name/Address of Sending Facility	Sending Unit	Sending Facility Phone

Sending Facility Contacts	Contact Name	Phone	E-mail
Transferring RN/Unit			
Transferring physician			
Case Manager/Admin/SW			
Infection Preventionist			

Does the person* currently have an infection, colonization OR a history of positive culture of a multidrug-resistant organism (MDRO) or other potentially transmissible infectious organism?	Colonization or history *Check if YES*	Active infection on Treatment *Check if YES*
Methicillin-resistant *Staphylococcus aureus* (MRSA)		
Vancomycin-resistant *Enterococcus* (VRE)		
Clostridioides difficile		
Acinetobacter, multidrug-resistant		
Enterobacteriaceae (e.g., *E. coli*, *Klebsiella*, *Proteus*) producing-Extended Spectrum Beta-Lactamase (ESBL)		
Carbapenem-resistant Enterobacteriaceae (CRE)		
Other, specify (e.g., lice, scabies, norovirus, influenza):		

Does the person* currently have any of the following? (Check here ☐ if none apply)

☐ Cough or requires suctioning

☐ Central line/PICC (Approx. date inserted ___/___/_____)

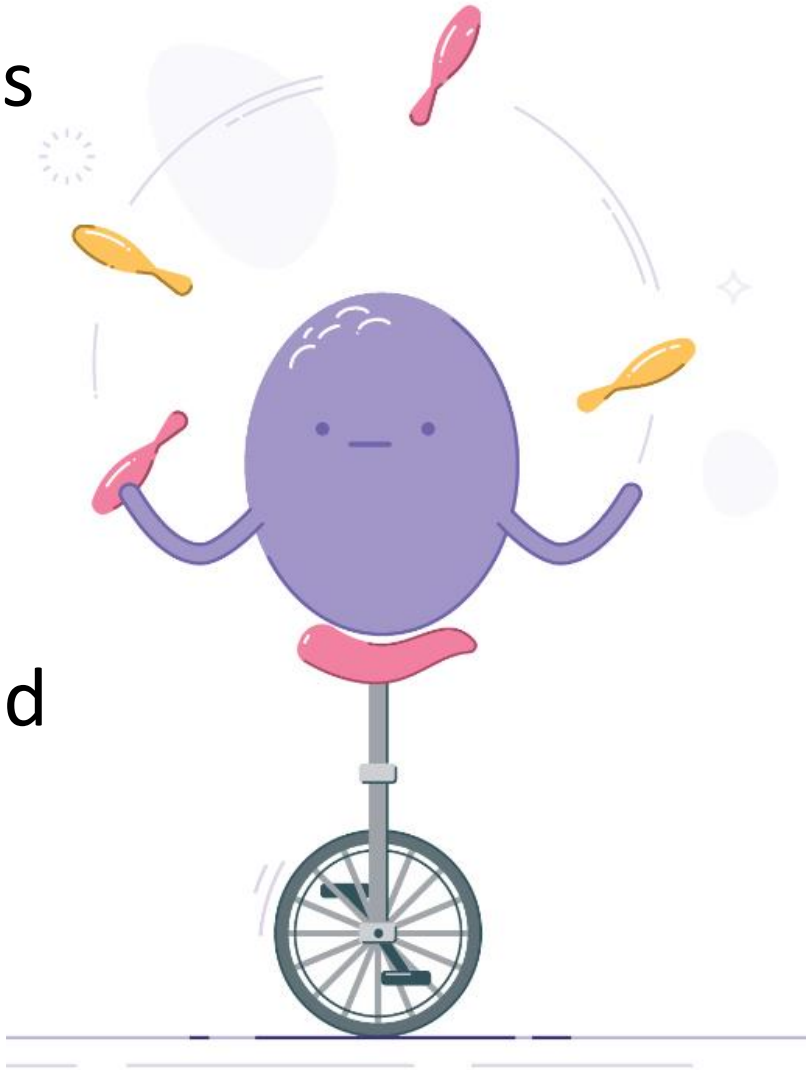
Containment steps when a case of *C. auris* is found

- Report the case to your local/state health department
- With health department, screen other patients who were in contact with the index patient to identify asymptomatically colonized individuals
- Infection control assessments to minimize transmission
- Meticulous prospective surveillance
- Health departments should assess other high risk facilities for patients asymptomatically colonized with *C. auris.*

Conclusion

It’s new bug using old tricks

- Drug resistant, makes people sick, and spreads
- Similar to CRE, VRE, MRSA, and other drug resistant bugs
- We are still learning a lot about *C. auris*, but we also know how to control the spread of other similar germs
  - Many of the same principles can be applied to *C. auris*



What Keeps Us Up at Night

C. auris leaping ahead of other *Candida*

Some top concerns

- Pan-resistance is here – need to control spread
- Inability to identify *C. auris*
  - Recent progress with increased awareness and use of MALDI-TOF
- Spread of *C. auris* and CPOs, especially in long term care facilities

What you should do next

- Ask your laboratory some questions: What do you use for yeast identification? Can you detect *C. auris?* Who do you inform if you find *C. auris?*
- If you are admitting a patients with hospitalization outside the U.S. in the last 12 months, especially if they have a carbapenem-resistant organism, think about screening for *C. auris*.
- If you are seeing a patient with *C. auris* infection, make sure they are in Contact Precautions, request AFST, and treat empirically with echinocandins. Get an ID consult!
- Do your part with infection control—perform hand hygiene!

Resources

- *C. auris*: https://www.cdc.gov/fungal/candida-auris/index.html
- Infection control tools for healthcare settings: https://www.cdc.gov/infectioncontrol/tools/index.html
- Nursing Home Infection Preventionist Training Course: https://www.train.org/cdctrain/training_plan/3814
- Antibiotic Resistance Laboratory Network

  https://www.cdc.gov/drugresistance/solutions-initiative/ar-lab-network.html
- CDC's containment guidance

  https://www.cdc.gov/hai/containment/guidelines.html

Thank you!

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  - Many others!

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- **Using the Webinar System**
  - Click the **Q&A** button in the webinar
  - Type your question in the **Q&A** box
  - Submit your question in the **Q&A** box
- **CDC Media: media@cdc.gov or 404-639-3286**
- **Patients, please refer your questions to your healthcare provider.**

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When: A few days after the live call

What: All call recordings (audio, webinar, and transcript)

Where: On the COCA Call webpage

https://emergency.cdc.gov/coca

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All continuing education (CME, CNE, CEU, CECH, ACPE, CPH, and AAVSB/RACE) for COCA Calls are issued online through the CDC Training & Continuing Education Online system (http://www.cdc.gov/TCEOnline/).

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Continuing education certificates can be printed immediately upon completion of your online evaluation. A cumulative transcript of all CDC/ATSDR CE's obtained through the CDC Training & Continuing Education Online System will be maintained for each user.

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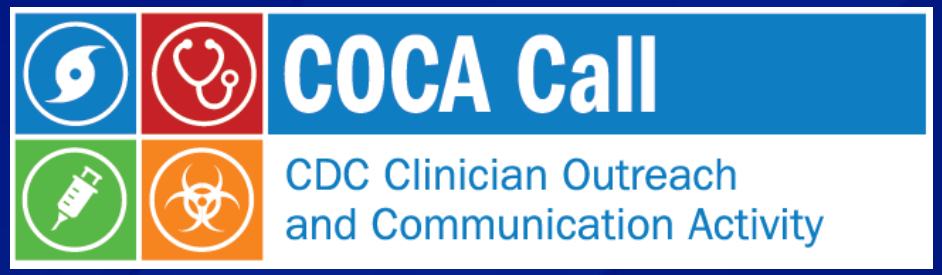

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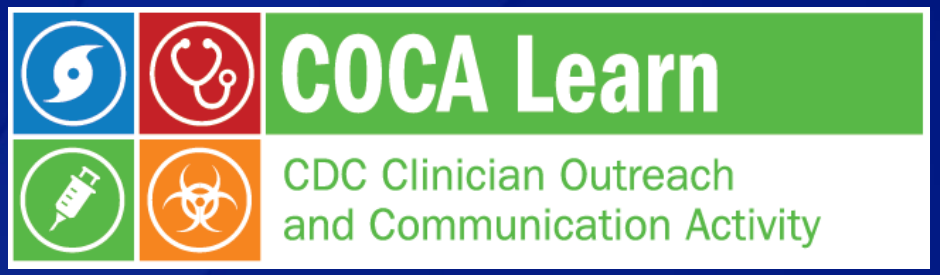

Monthly email that provides information on CDC training opportunities, conference and training resources located on the COCA website, the COCA Partner Spotlight, and the Clinician Corner.

Provides comprehensive CDC guidance so clinicians can easily follow recommendations.

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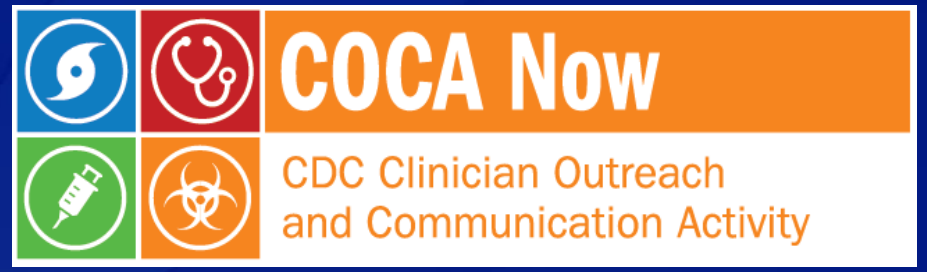

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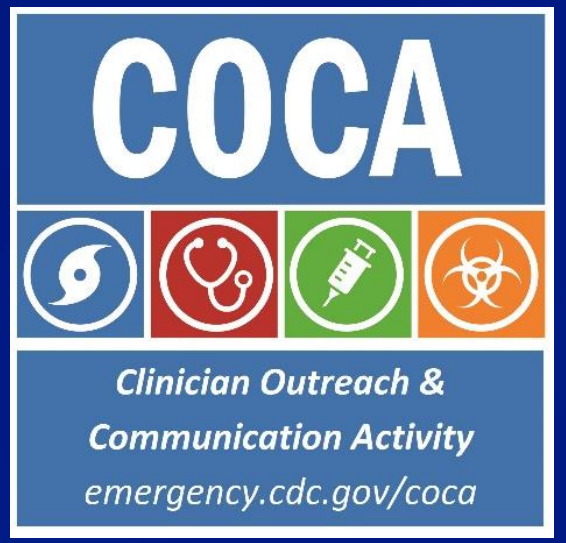

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